Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

JUN 10 1955

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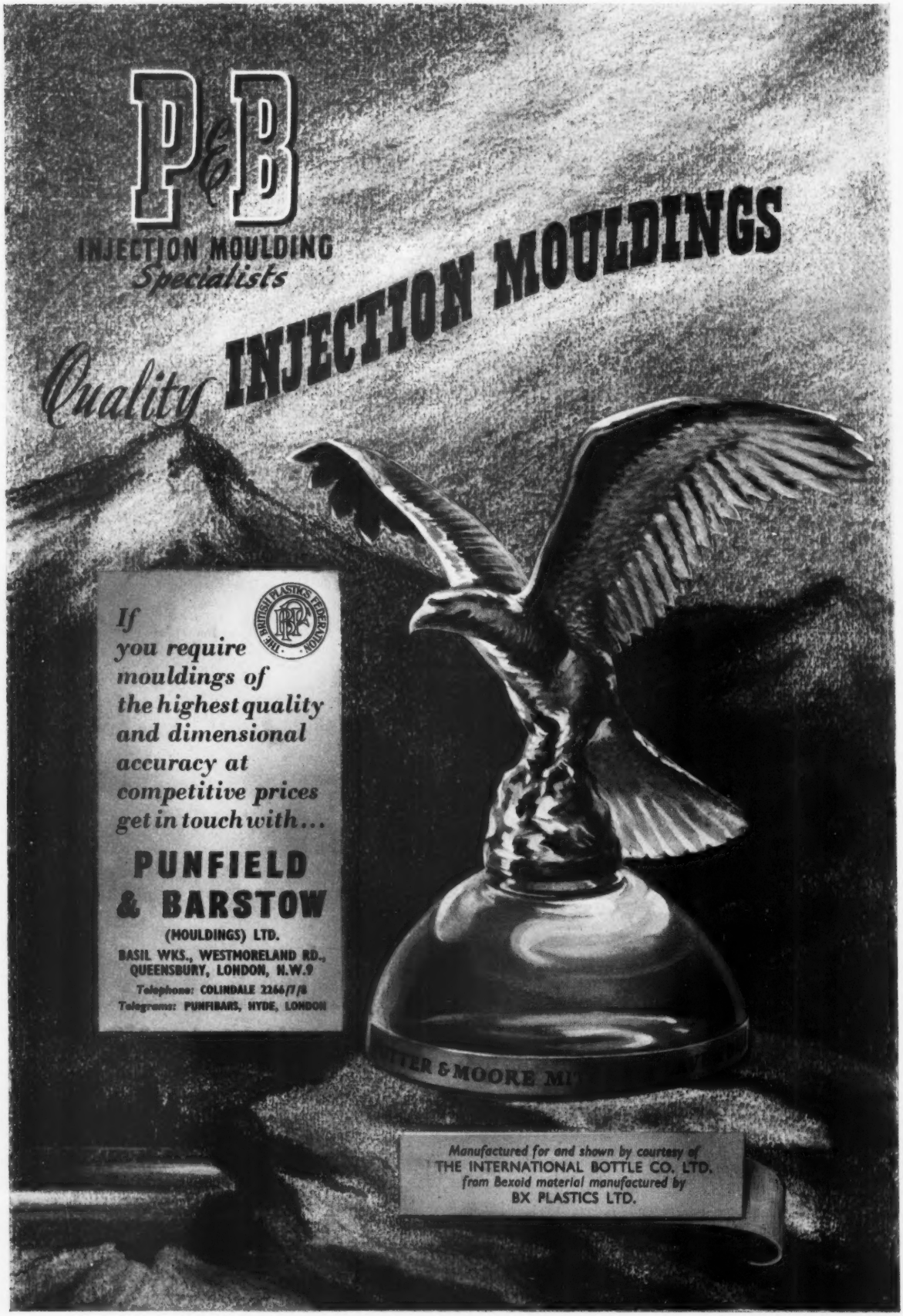
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Plastics Exhibition

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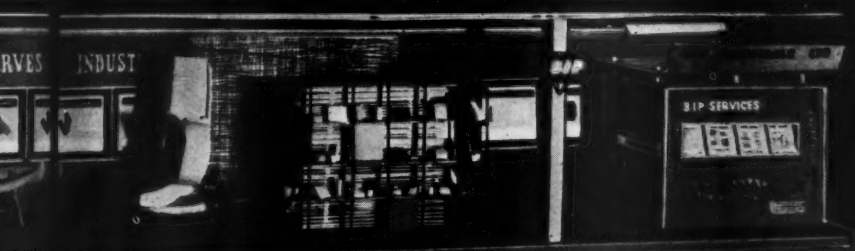

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Streetly Mouldings

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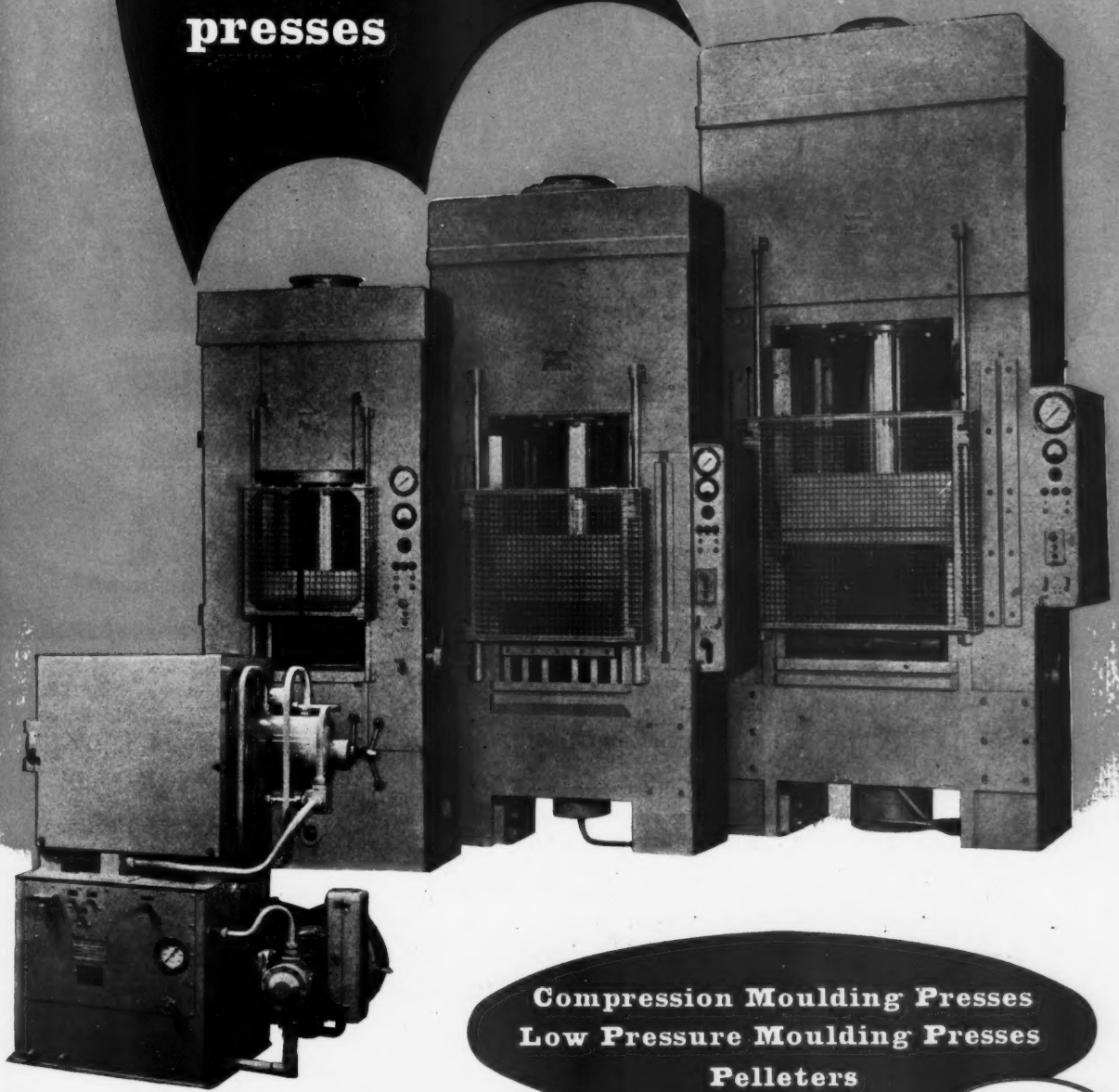

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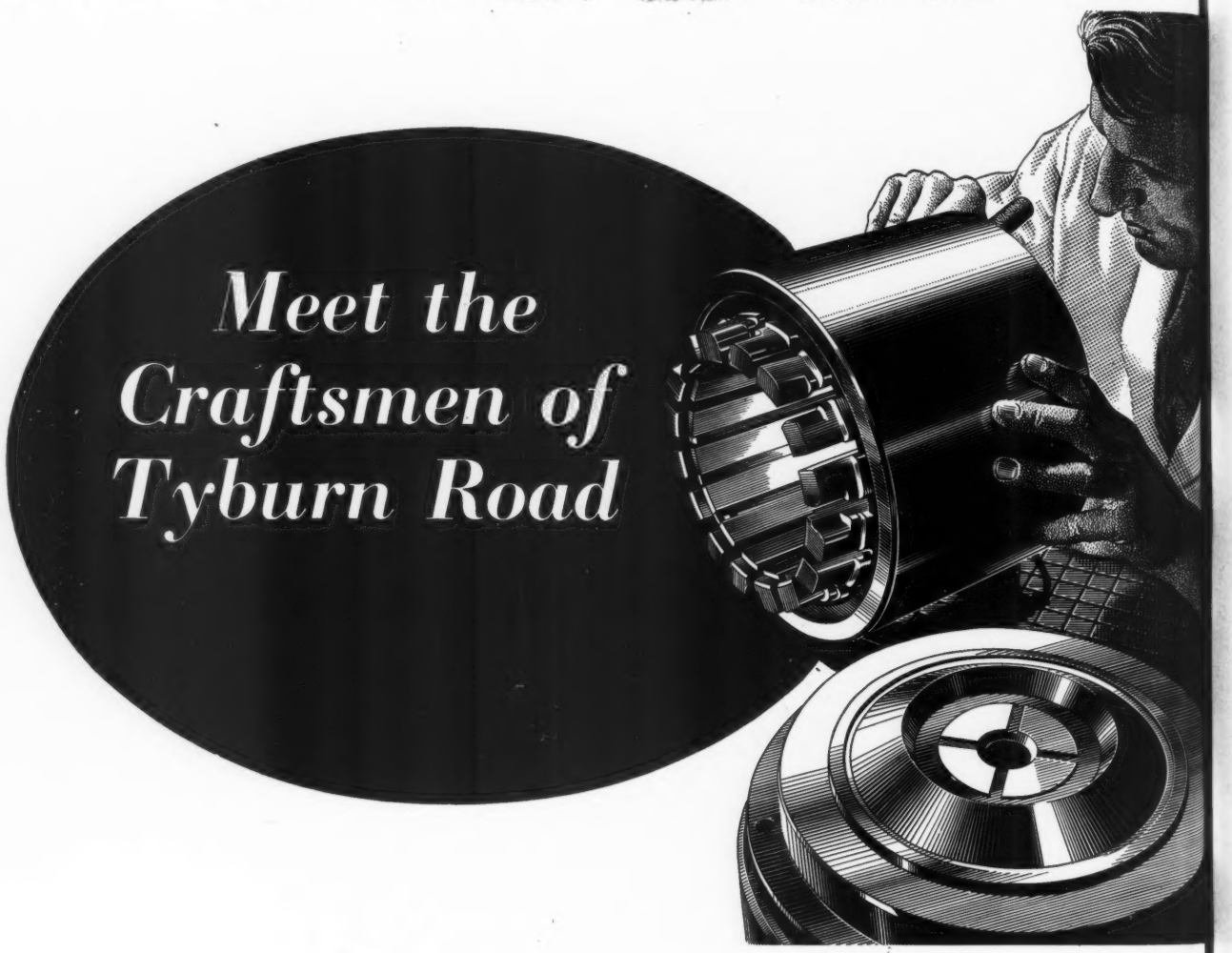

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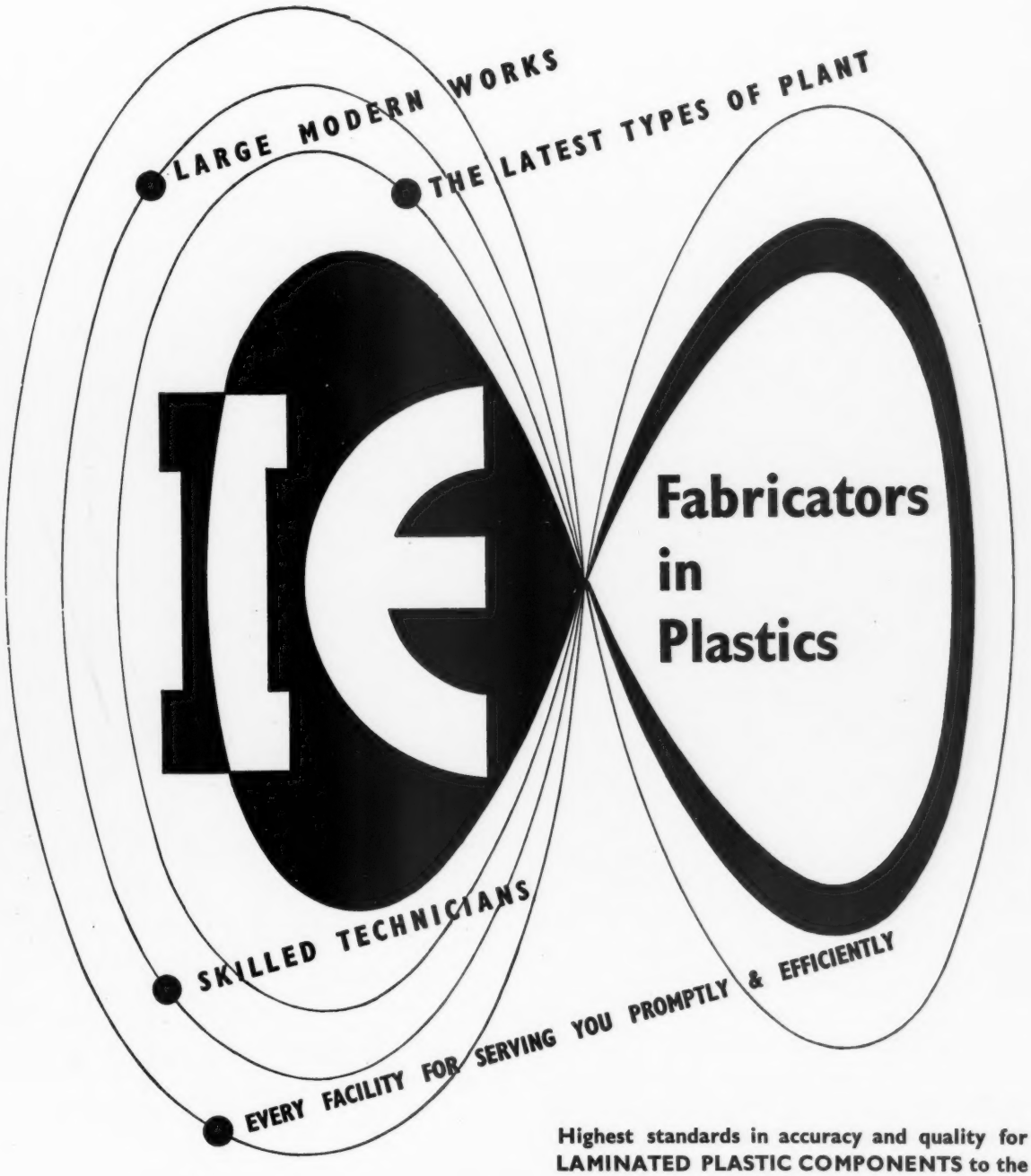
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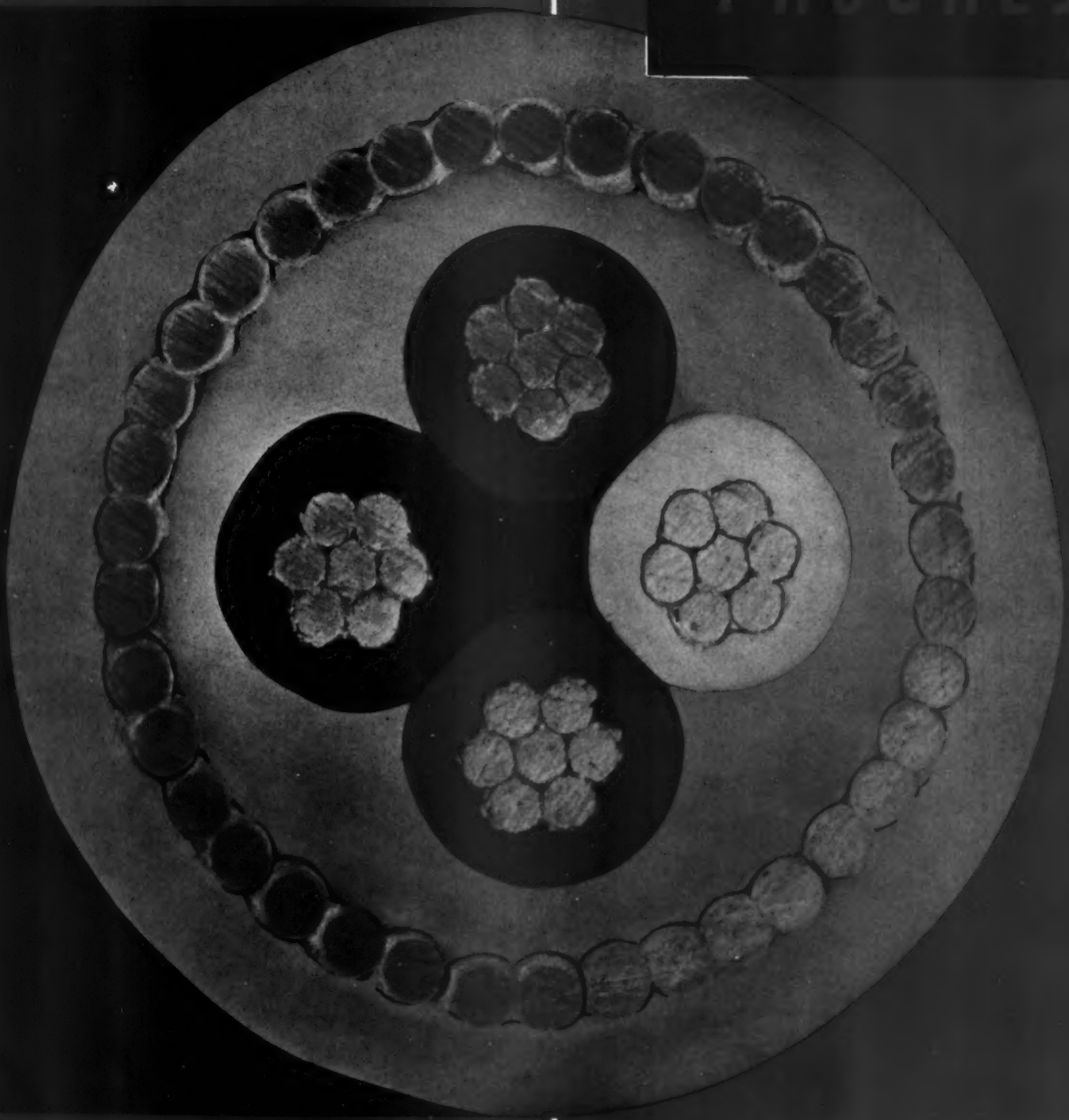
Bakelite
PROGRESS



Look to Bakelite Limited

STAND No. 74

Pioneers in the Plastics World

Sixteen pages illustrating some interesting developments in BAKELITE, VYBAK & WARERITE Plastics

Bakelite PROGRESS

SUMMARY OF PRODUCTS

Moulding Materials

BAKELITE Moulding Materials are based on phenolic, urea or alkyd resins. General-purpose grades are reasonably strong with good electrical properties, appearance and chemical resistance. In addition, the range includes many grades in which special combinations of valuable properties have been highly developed.

Laminated Materials

BAKELITE Laminated is produced in the form of sheet, rod and tube, combining properties of electrical insulation, chemical and heat resistance with good strength characteristics. It can be readily machined with metal- and woodworking tools. Based on phenolic, melamine and silicone resins, it incorporates paper, cotton fabric, asbestos and glass fibre fillers. Copper-faced grades for printed circuits, densified wood for tooling and general engineering, and compregnated wood for electrical insulation are also available.

Resins and Adhesives

The BAKELITE range of resins includes types suitable for a variety of bonding operations such as the manufacture of grinding wheels, flexible abrasives, brake linings, foundry shell moulds and cores.

Other grades are widely used in the manufacture of paints, enamels, electrical and marine varnishes, can and drum lacquers. Coatings based on these resins have a high degree of resistance to corrosion and weathering.

Adhesives are available for veneering, plywood manufacture, constructional woodwork, lamp capping, valve basing and metal-to-metal joints.

BAKELITE Polyester resins are used, with glass fibre, in the production of such structures as motor car bodies, boat hulls, radomes and components for commercial vehicle bodies. Other types are available for roof-lights and for the "potting" of electrical circuits.

Decorative Panels and Veneers

WARERITE Panels and Veneered Board provide decorative surfaces for walls and furniture which resist staining, moisture, hot teapots, etc. They are produced in a wide range of attractive colours and patterns, and are exceptionally easy to keep clean. Used in bars, restaurants, ships and the home, their durability helps reduce maintenance costs. Original designs and notices can be incorporated. Prefabricated WARERITE tops are made to measure. WARERITE Handy Panels for "doing it yourself" are on sale in shops.

P.V.C. Materials

VYBAK copolymer thermoplastics are supplied in the form of resins, extrusion and injection moulding compounds, rigid and flexible sheet. They possess excellent resistance to chemical attack and ageing, good electrical properties and dimensional stability. Their colour range is unlimited and they can also be transparent. They are used for cable sheathing, for rigid and flexible mouldings and, as sheet, for a wide variety of applications from vacuum cleaner parts to motor car side-screens and rear windows. One grade of rigid sheet has also been specially developed for the fabrication of chemical plant.

Asserting the Balance

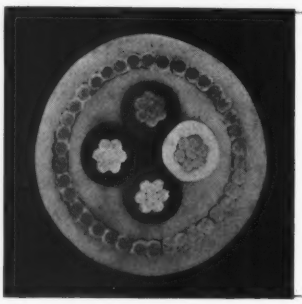
PROGRESS in plastics is at present proceeding at so great a pace that we are becoming accustomed to a steady stream of new materials leading to ever wider possibilities of application. So much so, that we are apt to overlook the materials which have been known and established in industrial importance for a long time, and to forget that, in spite of novelty, they continue to provide the bulk of plastics used today. There is rarely any question of their being supplanted by the newer materials, for these prove rather to be complementary, opening up new fields for plastics where previously nothing suitable had been available.

In describing uses which manufacturers make of the better-known BAKELITE materials, we are not 'putting the clock back', for even in industries, such as tele-communications, which have relied long on plastics, innovations are continually taking place. Nor is progress to be judged exclusively by the size of articles produced. Although some of the newer plastics permit much larger structures than hitherto to be built, there is often as much technical achievement to be found in the intricate detail of some minute moulding, such as the stepped wheel mentioned in our article on electric meters, or in a small section of phenolic laminate which, like the piece used in our feature on vibration generators, is put to arduous use.

Then again, whilst WARERITE Decorative Plastics are now very much a domestic furnishing material, to be found in the shops on a wide range of kitchen tables and other units, their early adoption by the shipbuilding industry has also gathered momentum. Most of the large liners launched during the past year have carried them and, as our pages devoted to the subject show, their use has now spread to all kinds and sizes of other vessels.

So, too, with the VYBAK group of vinyl resins and compounds. Big developments are taking place in this field. Meanwhile, however, they have become so firmly established as one of the standard materials for the production of electrical cable — the purpose for which they were originally developed as a wartime substitute — that a survey of their attributes for this purpose may not, we hope, be without point.

At risk of being platitudinous, we have also dealt at elementary length with the shell-moulding method of producing foundry moulds and cores, because this new technique would appear to have implications far beyond the immediate sphere of metal-casting, and here there may be many for whom it is still no more than a vague suggestion. Even for the expert, developments are taking place all the time ; some of them, as we show, resulting from the research undertaken by Bakelite Limited.



The picture on the preceding page shows a cross-section of a "Mervyn" 4-core electrical cable, made by the Mersey Cable Works Ltd., with sheathing and insulation of VYBAK compounds supplied by Bakelite Limited.

The trefoil symbol and the words 'BAKELITE' and 'VYBAK' are the registered trade marks of Bakelite Limited in Great Britain and certain other countries. The word 'WARERITE' is the registered trade mark of Warerite Limited (unit of Bakelite Limited) of Ware, Herts.

Tests of Reliability

'BAKELITE' LAMINATED IN VIBRATION GENERATORS

VIBRATION PHENOMENA are assuming ever increasing importance not only in industry for the reliability testing of such items as radio components and motor accessories, but also for complex structures like bridges and other civil engineering projects, and, even more so, in the field of armaments. In aeroplanes, guided missiles and their concomitant electronic devices, the trend is for more electrical equipment to be subjected to increasingly arduous conditions and, before vast sums are expended in its production, it is important to be able to assess the effects of the vibratory stresses which it will have to withstand. The design of machinery which can simulate these forces accurately is therefore a significant factor in many important contemporary developments.

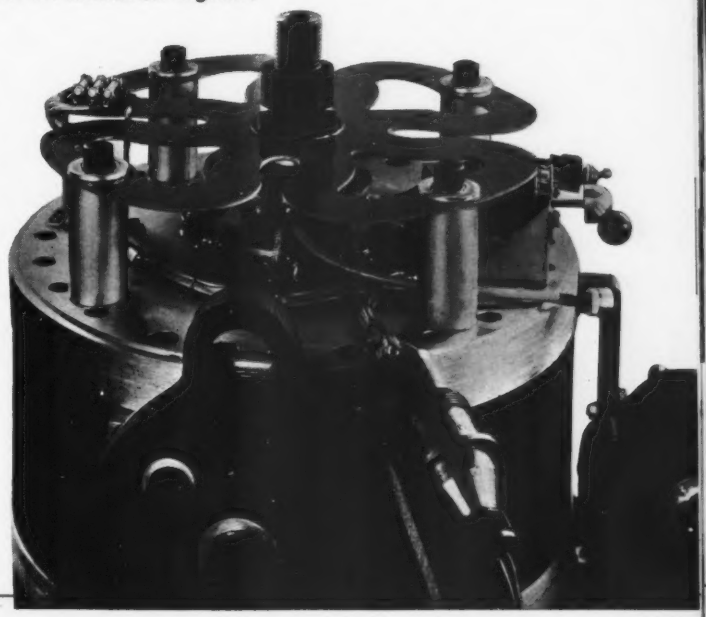
In respect of size, range and other qualities, the vibration generator shown here, Model 8/600, manufactured by Goodmans Industries Ltd. of Wembley, incorporates a number of notable advances, and it is due to no fortuitous circumstance that it is produced by a firm better known for its radio components. For, whilst vibration problems may appear to fall naturally within the province of the mechanical engineer, the subject is in reality closely analogous to acoustical and alternating current theory. The Goodmans' vibrator, indeed, is based upon the electrodynamic principle of a moving coil operating in a magnetic field provided by permanent magnets, the frequency and force of the vibration produced being determined by the frequency and magnitude of the electrical current supplied to the coil.

Compared with mechanical vibrating tables which are in general limited to an upper frequency of some 100 cycles per second and need to be stopped and adjusted for any alteration in amplitude, this type of instrument offers immediate advantages of wide frequency range and a high degree of stability. It is capable of producing a force of $\pm$ 300 lb. and up to 3,000 oscillations per second, its acceleration being limited only by the weight of the component being tested. At the same time there is no lower limit to its frequency response.

The generator has a central driving spindle on to which is mounted the armature, and it is here that BAKELITE Laminated has been able to solve a difficult problem for the manufacturers. In a machine which at its lower frequencies has a vibratory excursion of 1 in., it was no easy matter to find a material for the spindle suspension which would provide a very high degree of flexibility in the operating axis and at the same time the stiff radial location of the armature required to maintain the gap between the moving coil and the magnetic pole pieces.

After searching tests, a fabric-based grade of BAKELITE Laminated, F.5581, was found to be easily the most satisfactory material for this purpose and is now used to provide suspension spiders at either end of the driving shaft. These spiders are securely clamped in four places on their outer edges so that their centres have to absorb the full effect of vibration under heavy load ; but the mechanical qualities of the material amply suffice for this, whilst its easy machining properties facilitate cutting to correct shape and size. It is just these characteristics of strength and simple handling, indeed, that have led to BAKELITE Laminated's adoption for many purely mechanical purposes, and, in this instance, it is perhaps peculiarly appropriate that a material originally designed for electrical insulating purposes should be chosen for its outstanding physical properties in a field which the electrical technologist has annexed from the mechanical engineer.

Vibration generator, type 8/600, made by Goodmans Industries Ltd., being used in a resonance test on the prototype Handley Page Victor bomber.



The Goodmans vibration generator with the end-cover off to show the BAKELITE Laminated spindle suspension. A second similar spider is fitted at the other end of the driving shaft.

Off the beaten track

'BAKELITE' LAMINATED FOR SLEDGE RUNNERS

CONSIDERABLE PUBLICITY has been given to the contribution made by plastics to the recent conquest of Everest and other Himalayan peaks. As a variation on this theme, it may therefore be permissible to go a little way back into history and to another of the world's extremities to describe a use for BAKELITE Laminated which is quite remote from its normal industrial applications.

The more adventurous aspects of the combined Norwegian-British-Swedish Antarctic Expedition, 1949-1952, and of the South Georgia Survey, 1951-1952, have already been described elsewhere by those who took part in them, and here it perhaps suffices to say that their trials and tribulations were no less, and no less magnificently surmounted, than the legions of armchair camp-followers of Antarctic sagas would expect. More relevant to these pages is the fact that the runners for the sledges used on these expeditions were surfaced with a fabric-based grade of BAKELITE Laminated which in the event was found to offer a number of advantages over conventional methods.

The beginning of this story goes back still earlier to an experiment made by the Falkland Islands Dependencies Survey in Graham Land in 1947-8. For this a sledge was fitted half with BAKELITE Laminated runners and half with the usual hickory type, and given a trial over approximately five hundred miles of territory. At the end of this it was found that, whereas the hickory had worn some three-quarters of an inch, no wear at all was noticeable in the BAKELITE Laminated runner.

As a result of this, the material was adopted for all the dog-sledges of the subsequent expeditions, not only for the runners but also for the snowboards, i.e. the horizontal boards which are screwed to the underside of the cross-pieces to protect the load and which, in deep snow, have often to take its full weight. It was found that, by using BAKELITE Laminated, a saving of some 30% in weight could be achieved.

The method of fixing the surfaces to the runners was an important part of the development, and here again Bakelite Limited was able to make an original contribution with a special "wet abrasion" bonding process developed and patented by the Company. In the past, a difficulty in fabricating phenolic plastics has been the lack of a cement which will give a strong, permanent bond, without the application of heat. By abrading the surfaces to be bonded in the presence

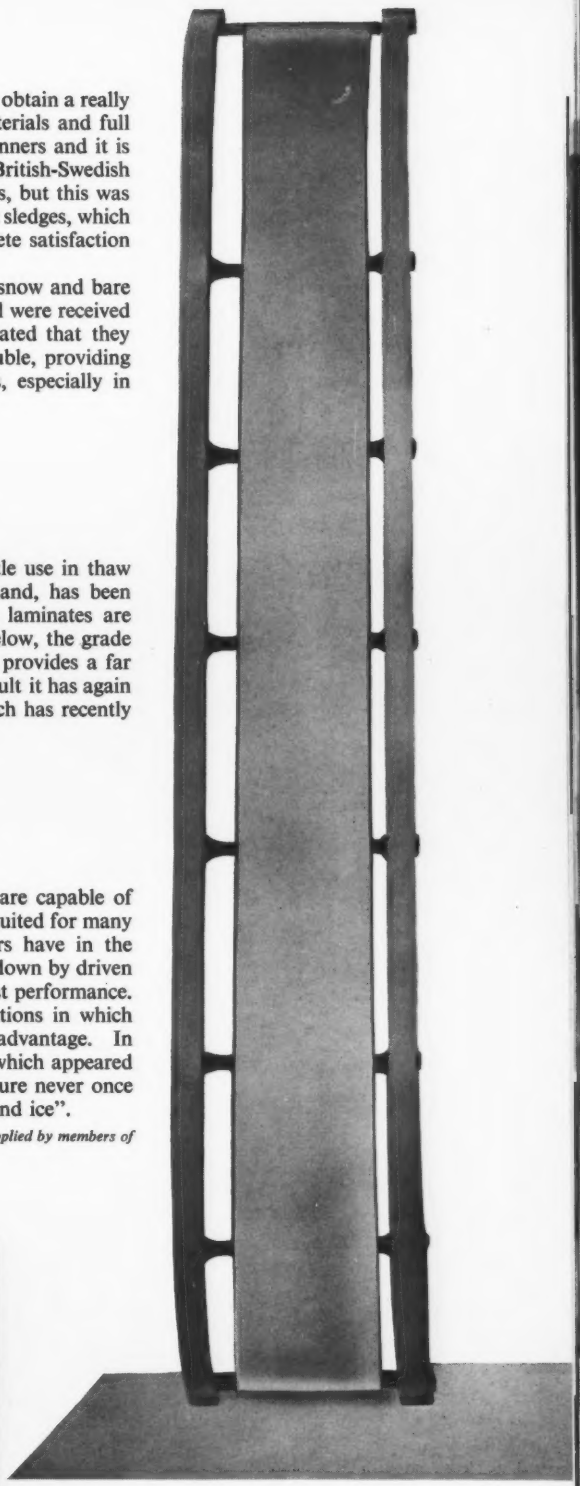
of a solution of special phenolic resins, however, it has been found possible to obtain a really strong joint with certain cold-setting adhesives. With all the necessary materials and full instructions provided by the Company, this was the method used on the runners and it is reported that in general they stood up to their task very well. The Norwegian-British-Swedish expedition, it is true, had some trouble with certain of their running surfaces, but this was not sufficient to cause serious inconvenience, and the group's Norwegian-built sledges, which were constructed in an identical manner, are reported to have given complete satisfaction over distances of nearly 2,000 miles with loads of more than 1,000 lb.

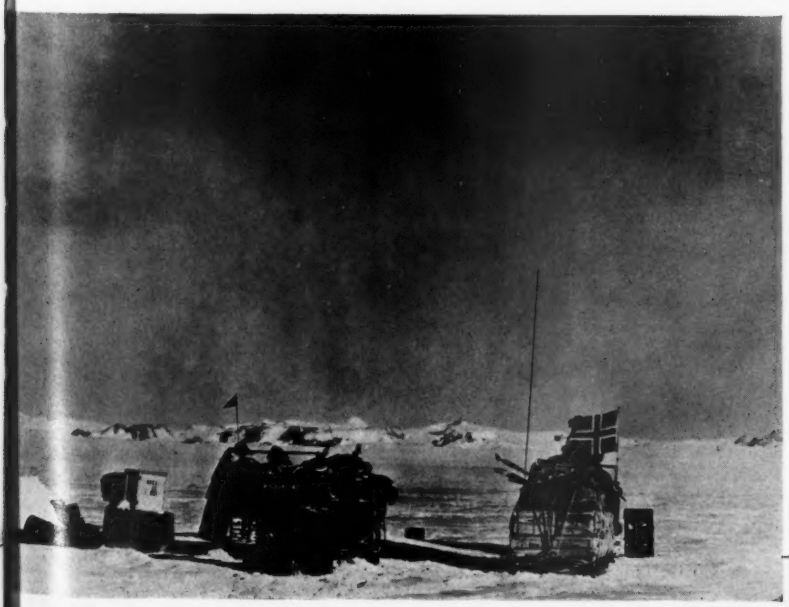
The South Georgia Survey operated over very difficult territory with wet snow and bare glacier ice interspersed with lumps of stone and grit, and no complaints at all were received about the performance of the plastics. On the contrary, it was officially stated that they took loads up to 800 lb. over extremely rough surfaces with very little trouble, providing fast running surfaces and being more easily pulled than wooden surfaces, especially in wet snow conditions.

Of the materials available for such purposes, hickory is said to be of little use in thaw conditions owing to its water absorption. Stainless steel, on the other hand, has been found to give poor surfaces below freezing-point. By contrast, phenolic laminates are considered to be efficient in both conditions and down to –25°C ; though, below, the grade used was less satisfactory. Even with this stricture, however, the material provides a far better working temperature range than was hitherto available, and, as a result it has again been chosen by the Australian National Antarctic Research Expedition which has recently been establishing a base on the Antarctic mainland.

It is, moreover, one of the most valuable features of plastics that they are capable of adaptation to specific requirements and, given this, they would appear to be suited for many tasks in polar conditions. In Antarctica, for example, wooden propellers have in the past been used on wind generators, but have been found to be quickly worn down by driven snow. Metal and plastics have also been tried, with the latter giving the best performance. Ration-boxes, ice-axe handles and aircraft skis are other potential applications in which the material's high strength-to-weight ratio might similarly be used to advantage. In such ways, plastics can contribute substantially to the penetration of lands which appeared to Captain Cook, when he went in search of them, to be "doomed by Nature never once to feel the warmth of the sun's rays, but to lie buried in everlasting snow and ice".

Note.—Information for this article has been drawn from "The Polar Record", July, 1953, and also supplied by members of the expeditions, to whom our thanks are due.





A sledge with BAKELITE Laminated runners and snowboard ; (Left) Loaded preparatory to moving off on the Norwegian-British-Swedish Antarctic Expedition.

Easier communications

'BAKELITE' MOULDING MATERIALS IN THE PRODUCTION OF TELEPHONES

The Ericsson intercommunication telephone which can be fitted for desk or wall use by the moulded cradle shown (Right).

FROM THE EARLIEST DAYS of the plastics industry a large proportion of the materials produced has been absorbed by tele-communications and, with the large-scale developments which have taken place in both spheres during the last few decades, this association has grown steadily closer. Without plastics it would indeed be difficult to visualize the complex telephone systems on which we now place daily reliance, for these materials have simplified inestimably the production of the innumerable intricate components which go to their construction.

Most obvious of all their uses in this field is perhaps the present moulded hand-set. In its compactness, styling and general handling qualities, it is a real triumph of industrial design, and the fact that economical mass-production of this can be achieved is due largely to its being moulded from BAKELITE phenolic materials.

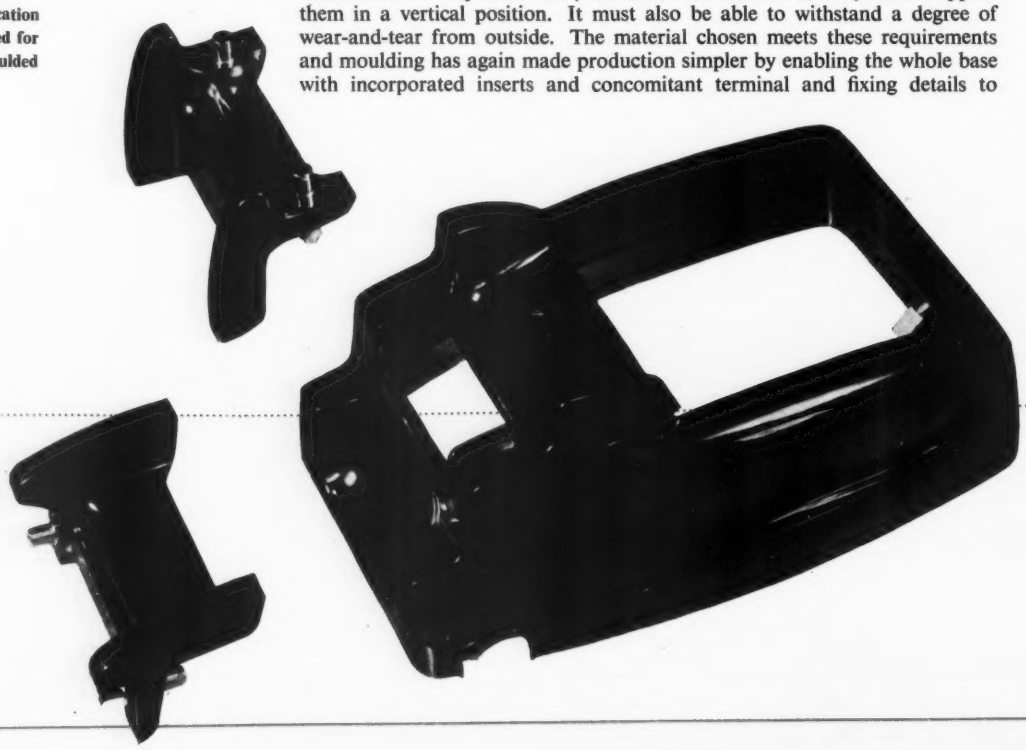
Even in an industry in which plastics are already so substantially established, however, developments continue to take place, owing partly, though not entirely, to the introduction of improved grades of material, and a survey of some of the recent products of the well-known manufacturers of telephone equipment, Ericsson Telephones Ltd., serves to demonstrate the greater ease of production that is attained thereby.

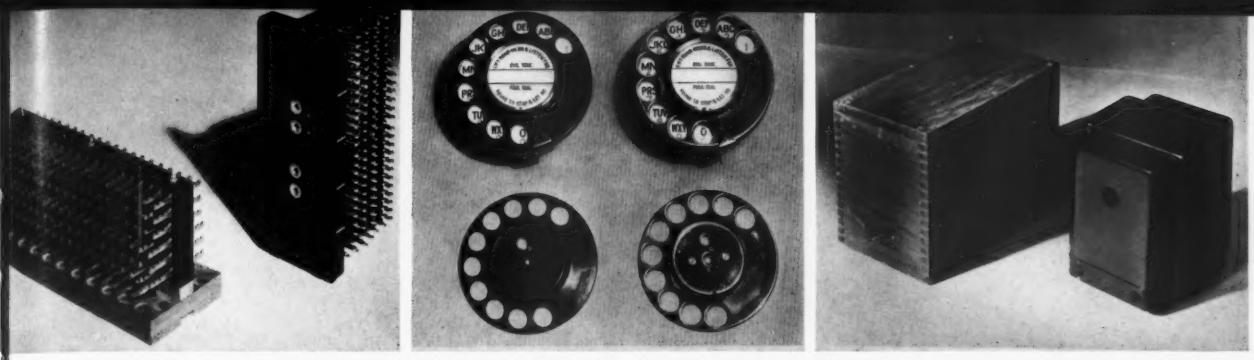
In the recent past this Company has been developing a new range of subscribers' apparatus items and outstanding amongst these is a new model of intercommunication telephone. Hitherto such telephones have been made by Ericsson with metal cases ; but, in the light of experience, the latest set contains more plastics than ever before. The main casing, cover, cradle and hand-set are all moulded from black BAKELITE phenolic materials.

As usual, moulding has increased the designer's freedom of creation. As a result the manufacturers, in their own words, justly feel that "they have achieved that happy combination of design for manufacture and design with aesthetic values which is a delight in any industrial development".

Reinforcing this claim is a simple device whereby the set can be easily adapted for use on desk or wall without the addition or subtraction of a single part. This is achieved by making one half of the moulded micro-telephone cradle reversible by disengaging two nuts and screws.

The set is also remarkable for the fact that its base is moulded from a recently developed grade of BAKELITE high-impact polystyrene. This base carries all the components and, when the set is fixed to a wall, has to support them in a vertical position. It must also be able to withstand a degree of wear-and-tear from outside. The material chosen meets these requirements and moulding has again made production simpler by enabling the whole base with incorporated inserts and concomitant terminal and fixing details to





Three telephone components made by Ericsson Telephones Ltd. (Left) A wooden and a moulded terminal block; (Centre) A moulded and a metal finger plate; (Right) A wooden and a moulded generator box. By adopting BAKELITE phenolic moulding materials for these parts, substantial production economies have been achieved.

be made in one operation. In addition, certain sections of the base have been given thin walls which can, if necessary, be knocked out to provide apertures, should it be more convenient, as in the case of the wall set, to pass the external wiring through it. At the same time tubular rivets are let into the moulding to secure the telephone's rubber feet when it is standing and to serve as fixing screw holes when it is mounted on a wall.

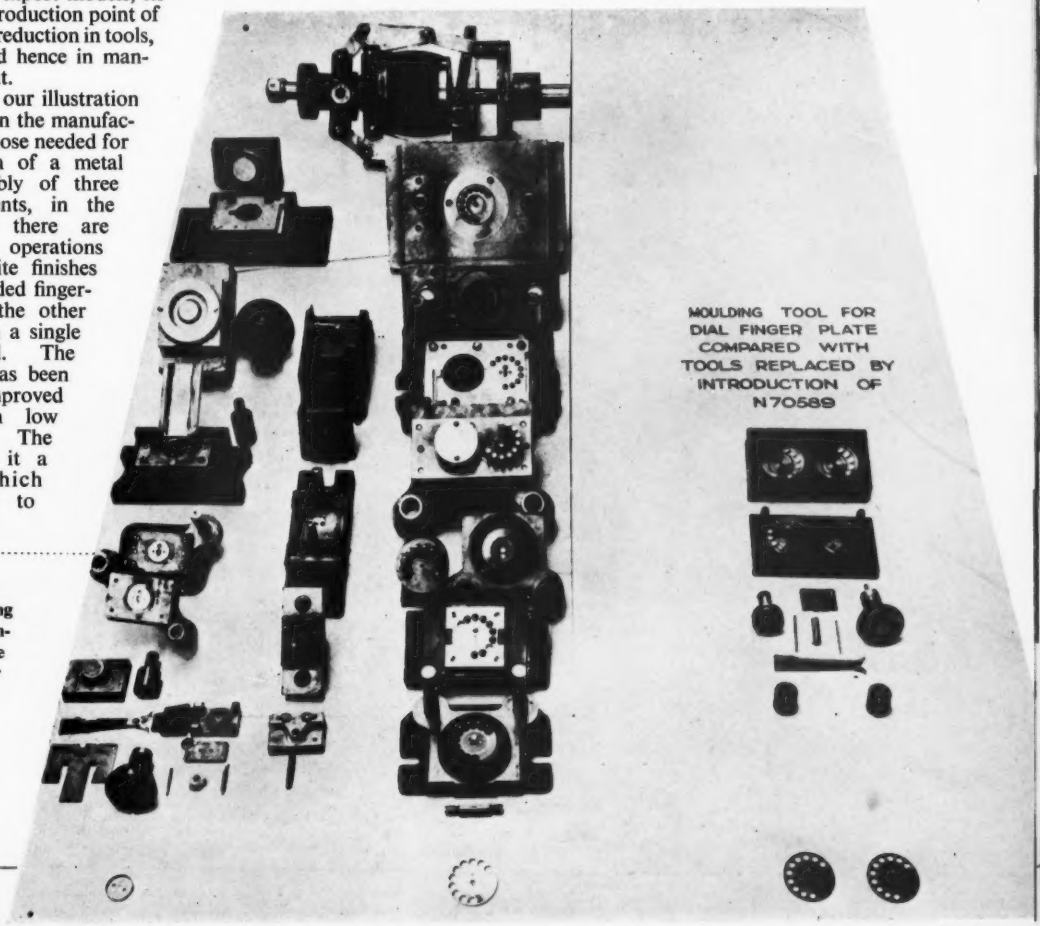
Completing the story of plastics in this product are ivory-coloured selector buttons, p.v.c. insulation for both the internal wiring and external leads, and, for desk use, a separate moulded terminal block and cover.

DIAL 'PLASTICS'

Whilst this telephone may be looked upon as something of a major work in plastics composition, there are, too, a number of other components made by Ericsson Telephones Ltd. in the production of which significant economies have been achieved by switching to plastics. Amongst these, a particularly striking item is a dial finger-plate moulded from a special nylon-filled grade of BAKELITE Material, X.11072. This type of plate is now in general use on export models, its great advantage from the production point of view being the substantial reduction in tools, number of operations, and hence in man-hours, which it brings about.

This is demonstrated in our illustration comparing the tools used in the manufacture of metal plates with those needed for plastics. The production of a metal plate requires an assembly of three different metal components, in the manufacture of which there are twenty-two machining operations together with the requisite finishes on each item. Two moulded finger-plates, with inserts, on the other hand, can be produced in a single operation in one mould. The BAKELITE material used has been chosen because of its improved strength combined with low moisture absorption. The nylon filler imparts to it a certain elasticity which enables the mouldings to resist impact and distortion despite the thinness of some sections, and it may be noted that one of the tests successfully withstood consists of depressing the rim of the finger-plate, when it is mounted in position, until it touches the printed base-plate beneath.

Two other Ericsson components, a switchboard terminal block and a generator case, tell a similar story of swifter, less laborious production in BAKELITE materials. The fabrication of the first of these used to require fifty-six separate main and subsidiary operations, but, by moulding the block in BAKELITE X.761/5, which has improved resistance to moisture, this has been reduced to twenty. Similarly with the generator case, nineteen former woodworking operations are reduced to four by moulding in X.387, a material designed to meet G.P.O. specifications, and at the same time an article of better finish is obtained. Such figures are in the grand tradition of plastics and, in these days of increasingly costly manpower, point to still untapped potentialities of even old-established compounds.



The tools required for producing metal finger plates (Left) compared with those used in the manufacture of moulded finger plates (Right).

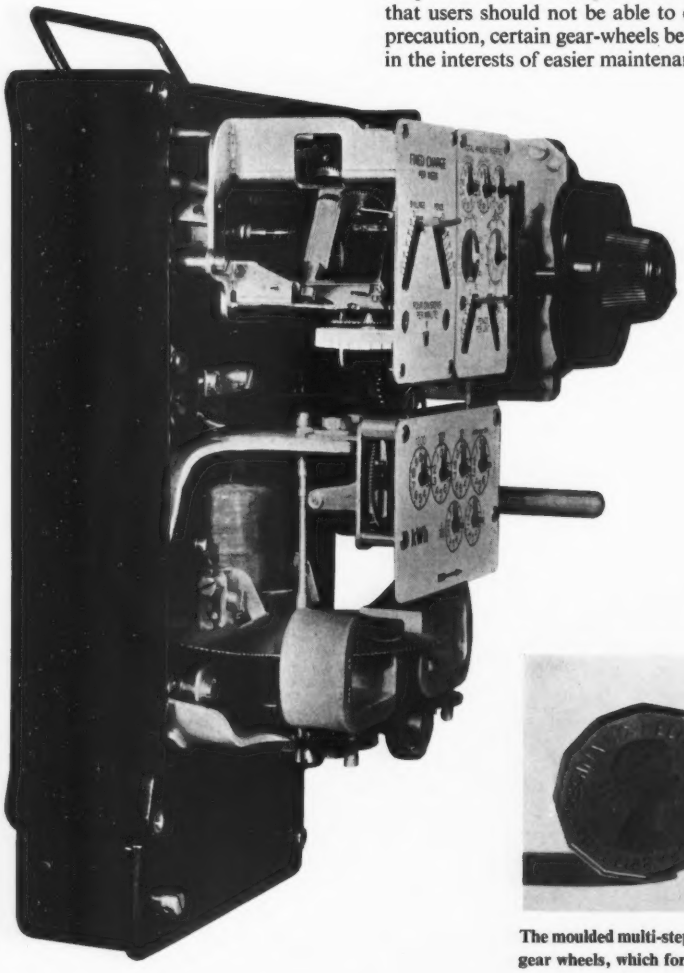
A Modern Meter

Elgee A.C. prepayment meter made by Landis & Gyr Ltd., Acton.

MESSRS. LANDIS & GYR, of Acton, are one of a small number of manufacturers who specialize exclusively in the production of electric meters, and their present A.C. prepayment meter is probably typical of the advances which have been made in the design of these instruments in recent years. Meters of course belong to the category of things which are now taken for granted, even though, in their present form, they are of a complexity which would have surprised our grandfathers. Very considerable improvements have indeed been made in their range, accuracy, appearance and, not least, in the methods of producing them, and the Elgee meter, featured here, is also typical of the way in which BAKELITE Plastics have contributed to this progress.

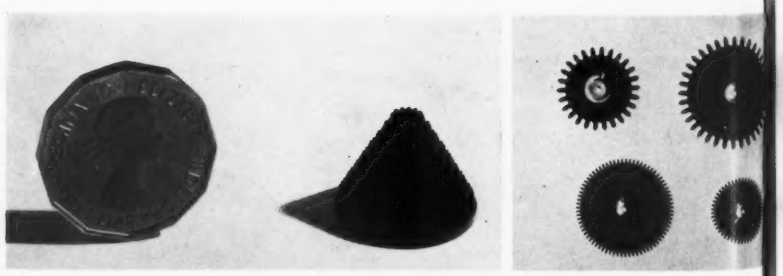
Both the cover and the base of this meter are moulded in one operation from BAKELITE Material X.20/5/3 — a grade specially designed for this application — and when the elaborate contouring of each of these parts is considered, the saving in production time as compared with the earlier metal cases will be readily appreciated. Instead of the laborious manufacture and assembly of numerous parts, the mouldings come out of the press complete with a high finish, requiring only the removal of flash. All the metal inserts required for fixing the mechanism are moulded in position at the same time, and the base incorporates in one piece even the terminal block.

For it is a further advantage of BAKELITE materials that they are good insulators and so provide their own protection from mishaps. Nowadays, indeed, it is a requirement that users should not be able to come into contact with any metal parts, and, as a further precaution, certain gear-wheels between the main units, which are made separately removable in the interests of easier maintenance, are also cut from BAKELITE Laminated.

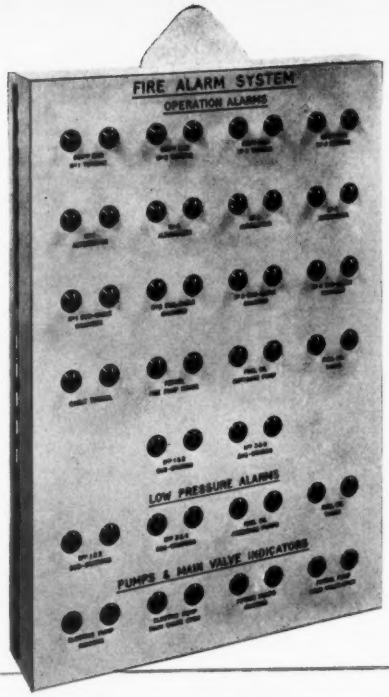


On looking inside the meter another small, but interesting moulding may be observed behind the fascia of the price-change unit, with a second similar one in the fixed charge unit which is added when a two-part tariff is in operation. This moulding takes the form of a conical, multi-step wheel which performs the function of a set of coaxial gears, transmitting to the differential the various prices decreed by the setting of the two levers in the gates of the unit, and upon its dimensional accuracy depends the whole system of adjustment of a mechanism which allows a very wide choice of charges to be levied. It represents indeed an exceptionally fine piece of tooling and moulding to close limits, and would have required intricate machining from any other material.

Mouldings also provide the coin knob in two sections and the coin housing of the machine. All of these parts are produced in the firm's own moulding shop at its Acton works and for all of them BAKELITE X.20/5/3 is used, simplifying still further, by the universality of its application, the manufacture of this compact, highly efficient revenue collector.

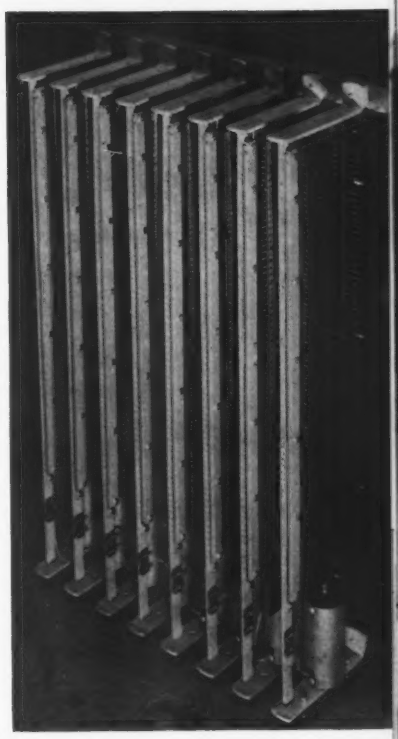


The moulded multi-step wheel compared in size with a threepenny piece, and laminated gear wheels, which form part of the mechanism of the meter as shown (Left).



Miscellany

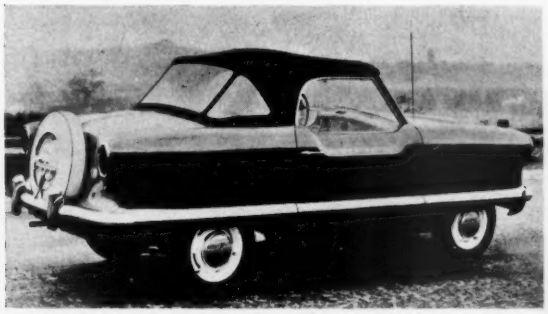
In the new British Electricity Authority Power Station at Rye House, Hoddesdon, WARERITE Plastics have been used to construct this fire alarm annunciator board. It has been built to specification in the Company's own workshops from WARERITE Veneered Board incorporating a green Stardust pattern with interior fittings fabricated from black WARERITE Panel. These materials are particularly hardwearing, have good insulating properties and are themselves fire-resistant. At the same time, the printing on the face of the board is also incorporated permanently into the material.



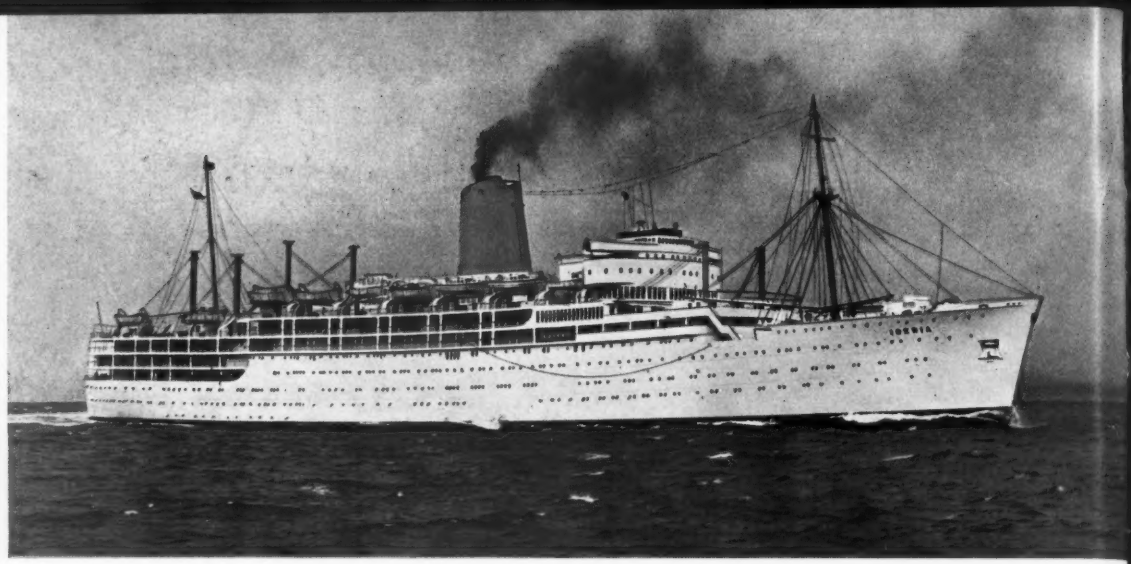
This coupler switch unit for the organ in Adelaide Cathedral, Australia, has been built up by R. A. Williams (Birmingham) Ltd. on insulation plates made from a paper-based grade of BAKELITE Laminated, P.5586, and an angle section of similar material, B.100. All the contacts of the unit are mounted on these plates, and each switch is designed to make and break 66 circuits simultaneously. BAKELITE Laminated was chosen for the job not only because of its sterling electrical qualities and dimensional stability in changing climatic conditions, but also for its durability ; a particularly important factor in an installation such as this, which is expected to give long-term service without the need for maintenance.

Both these measuring tapes, manufactured by Jas. Chesterman & Co. Ltd., Sheffield, are housed in shock-resisting BAKELITE Moulding Materials. For the fork handle of the dip-measure steel tape, a fabric-filled grade, X.199/3, has been adopted and has been found to give much better serviceability in wet conditions than wooden handles. The other tape has been specially produced for use in South African gold mines and for its housing, another fabric-filled BAKELITE compound, X.199/14, was chosen instead of leather because it, too, is resistant to moisture, as well as to oil, white ants and harsh treatment — all of which are likely to be encountered.

Whilst full-scale mass-production of car bodies from plastics remains around the corner, the glass fibre/polyester resin combination is now being enthusiastically adopted for limited lines and special bodies. The Martin car, shown here, is one of the latest models to have a body made from glass fabric bonded with BAKELITE polyester resins. Designed and built by Martin Plastics Ltd., Maidstone, the car has a Ford 8 engine and the body is mounted on a Ford 8 H.P. or 10 H.P. chassis.



VYBAK clear flexible sheet for the large folding rear windows of drop-head automobiles is another recent development which has won wide popularity. It is now being used on most of the convertible models at present produced in the U.K., and is here to be seen on the Nash Metropolitan, which is produced by the Austin Motor Company Ltd. for export to the U.S.A.



The S.S. IBERIA, 29,000 ton liner built by Harland & Wolff Ltd. for the Peninsular and Oriental Steam Navigation Co.

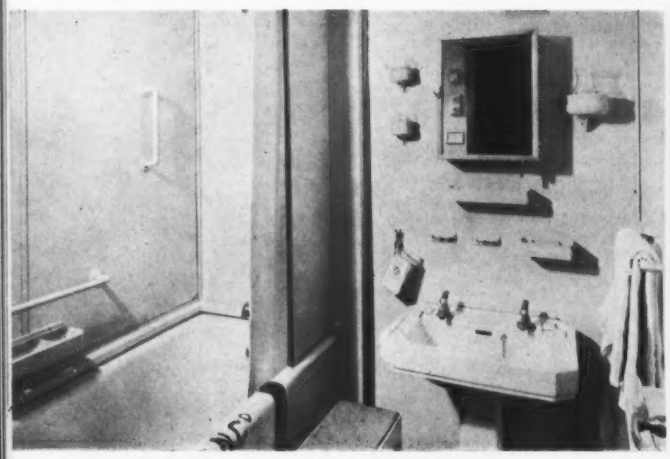
Great and Small

'WARERITE' PLASTICS IN SHIPS

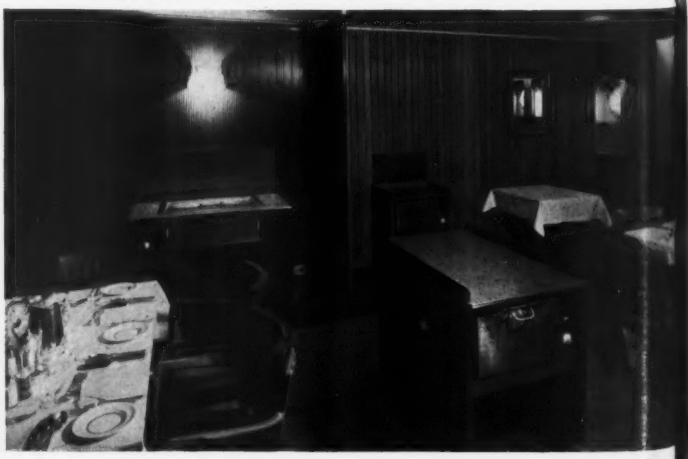
In the 29,000 ton P. and O. liner S.S. IBERIA, large contemporary paintings depicting a Portuguese fishing village by David Lewis have been incorporated in WARERITE Plastics for protection from damage.

In the S.S. SAXONIA, 22,000 ton liner built by J. Brown & Co. (Clydebank) Ltd. for the Cunard Steamship Co. Ltd., alcohol-resisting WARERITE Plastics incorporating a special blue and white snow crystal design have been used to decorate the Yukon Bar. Architect : E. C. Leach, Esq., F.R.I.B.A. Contractors : White Allom Ltd.

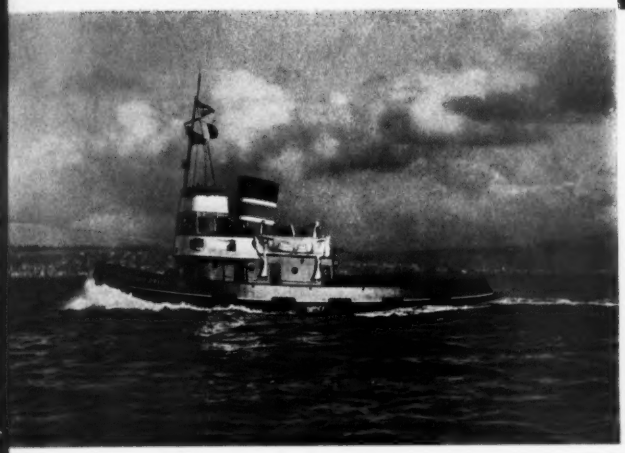
One of the many bathrooms in the S.S. IBERIA which has been completely panelled in colourful, water-resisting WARERITE materials. Designers for the Interior : Messrs. McInnes Gardner & Partners. Consultant Designer : Miss Barbara Oakley. Contractors : Waring & Gillow Ltd. and H. H. Martyn Ltd.



The first-class dining-room in the Orient liner ORSOVA built by Vickers-Armstrong Ltd., in which the tops of the dumb waiters and other serving counters have been surfaced with easily-cleaned WARERITE materials in a green colour texture. Architect : Brian O'Rourke, Esq. Contractors : Waring & Gillow Ltd.



In the tug CAEDMON CROSS, built by Messrs. Scott & Sons for the Tees Towing Co. Ltd., WARERITE Plastics have been used for bulkhead panelling and furniture surfaces because they help to reduce maintenance costs. A combination of buff Finaweave and check patterns creates a colourful interior.



(Below) Green Finaweave WARERITE Plastics are used to line many of the crew's cabins in the Royal Mail Lines passenger-cargo ship LOCH GOWAN, built by Harland & Wolff Ltd.

SHIPBUILDERS, amongst the earliest users of WARERITE Decorative Plastics, have recently been specifying them on an ever increasing scale, and here we allow pictures to tell the story of their installation not only in the lavishly decorated passenger accommodation of all the large liners which have lately been in the news, but also for the crews' quarters of a variety of smaller vessels, including even harbour tugs. This is the result of the combination in WARERITE Plastics of really hardwearing qualities with rich, permanently decorative features, leading to conspicuous reductions in maintenance costs. With their aid, standards of interior decoration in arduous conditions can be raised, and amongst recent trends in the bigger ships is the widening popularity of a process which Warerite Limited pioneered many years ago : the incorporation of original designs, water-colours, etc., in the laminate for permanent protection from damage.

The first-class beauty parlour in the T.S.S. ARCADIA, built by J. Brown & Co. (Clydebank) Ltd. for the P. and O. WARERITE plastic panelling and tops in a green stardust design here help to create and maintain hygienic conditions.

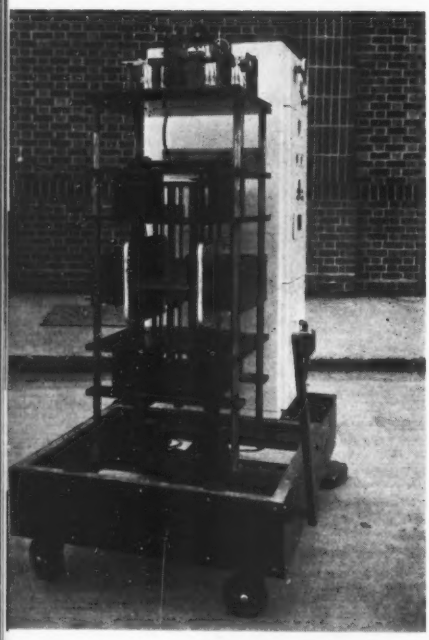
(Above) The Compagnie Belge-Antwerp steamer LUBUMBASHI, built by Soc. Anon. John Cockerill, for service between Antwerp and the Belgian Congo. Shown here is the officers' mess which is panelled throughout with WARERITE Plastics incorporating a marble finish. WARERITE materials are also used extensively elsewhere in the ship.

'Bakelite' Resins

FOR FOUNDRY SHELL MOULDS & CORES

TWO YEARS or so ago it was possible even in informed circles to pose such questions as : "What exactly are shell moulds ?" and "How does the plastics industry come into it ?" To-day discussion centres around ways and means of improving the process in essential details. For, during the intervening period, immense interest has been aroused in a technique that has been described as the most revolutionary advance ever made in the history of metal casting.

Synthetic resins have of course been used for some time in foundry work as core-binders and also for sealing porous castings, but with shell-moulding the association has become much more fundamental. A mixture of sand and thermosetting resin forms the basis of the technique. This is placed in an invertible container or 'dump-bucket' over which is clamped a heated metal pattern. When the bucket is inverted, the mixture falls upon the pattern where a proportion of the resin is fused by the heat, forming a 'shell' which faithfully reproduces the outline of the pattern. The bucket is then turned upright again, and the unused part of the mixture falls back to the bottom ready for the next investment. This stage is usually accomplished in a matter of seconds and the pattern with the shell adhering to it is thereupon removed to an oven for final curing of the resin. By this treatment the shell, which comprises half a mould, is formed into a hard, infusible solid and can be removed immediately from the pattern. To complete the mould, two such shells are clamped together by any convenient means ; clips, bolts or a synthetic adhesive all being used. A suitable grade of the latter has been specially developed by Bakelite Limited, together with H.F. heating equipment which enables shells to be bonded in a few seconds. The mould is now ready for pouring.



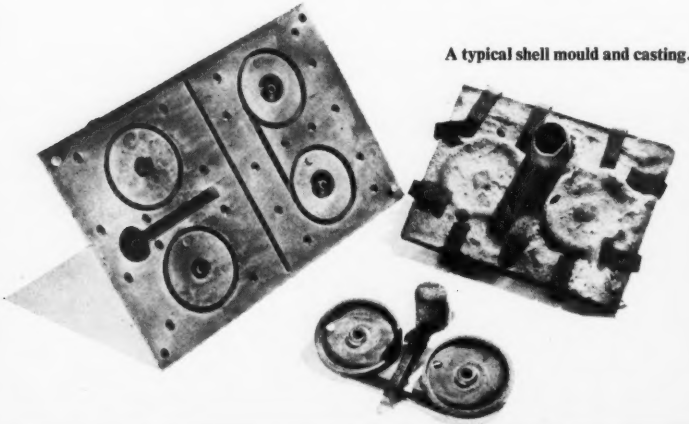
(Left) H.F. equipment, specially designed by Bakelite Limited for assembling shell moulds with BAKELITE Adhesives.

Whilst snags may arise, the method remains in essence as simple as this, and its advantages are numerous. Firstly, improved surface finish to castings is obtained. Since the mix is completely dry, troubles arising from the varying moisture content of a green sand mould are eliminated, and, at the same time, the thinness of the shell permits free escape of gases without the need for venting systems. This is of great assistance in combating porosity of castings. Dimensional accuracy is also more easily maintained and casting to much closer tolerances made possible, so that machining time can be substantially reduced. The metal, moreover, may be poured rapidly without fear of sand-wash and also runs faster across the surface of the mould, thereby enabling very thin sections to be cast.

On the handling side shell-moulding similarly offers advantages. Shells are light in weight, but strong, so that they can be easily moved to pouring points, etc. They take up relatively little space in the workshop and may be stored indefinitely, thus assisting the planning of production. Complicated moulds can be produced as easily as simple ones and the amount of sand to be handled is very substantially reduced. At the same time, whilst shell moulds can evidently be produced with the most rudimentary equipment, the process lends itself to complete mechanisation. There are now machines in existence — and others being developed — which allow the whole shell-moulding cycle to be performed and controlled automatically, with still further reductions in costs. All of these factors more than offset the extra initial cost of the sand-resin mixture.

The development of this technique provides an outstanding example of co-operative effort by the foundry and plastics industries. Synthetic resins have such diverse applications that it is of course no new

(Right) A shell and pattern being removed from the dump bucket.



A typical shell mould and casting.

departure for their manufacturers to have to acquaint themselves in some detail with the ways of other industries in order suitably to adapt their own products to specific needs ; but, with shell-moulding, this has been very strikingly the case. Recognizing that the provision of efficient and economical resins would have an important bearing on the progress of the technique, the Research and Development Department of Bakelite Limited has devoted much time to the detailed development of the process. Experimental equipment was initially installed in the Company's laboratories, leading later to the erection of a complete metallurgical workshop with a crucible melting furnace staffed by experienced foundrymen. Here, in addition to research, many practical demonstrations have been given to foundry representatives, often using patterns provided by themselves. By such methods a range of suitable resins has been developed for varying requirements, and these are now in full production.

More recently, the attention of these laboratories has been given to the development of shell cores. Whilst it is perfectly feasible for shell moulds to be used in conjunction with conventional cores, it was felt that cores made in the same way would offer advantages in speed of production and of finish which might well result in reduced costs. As an obvious first step, therefore, the sand-resin mixture was simply poured into a heated core-box, the excess being turned out after a core had been built up and the latter being stoved in the normal way. This method, however, was found to be limited to simple cores, greater impetus

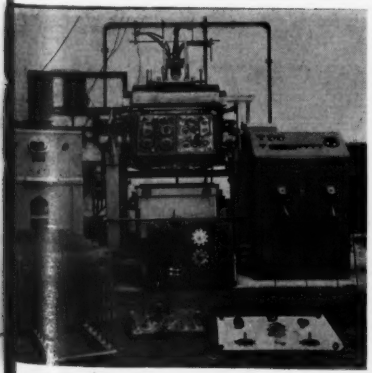
Shell cores made with BAKELITE foundry resins.

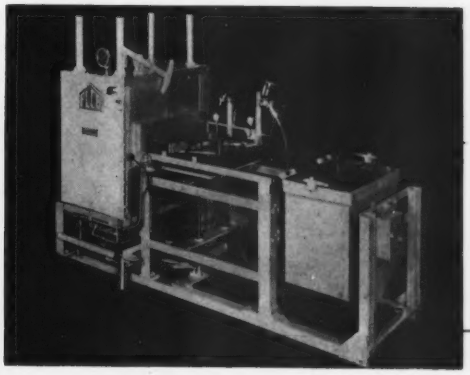
Shell moulds in use at J. Harper Ltd. The space saved by this method can be seen by comparison with an equal number of conventional moulds in the background.

to the mixture being necessary in intricate designs to enable it to reach the more distant parts. As a next step the hot core box was therefore attached to a dump-bucket in place of the normal pattern and this was found to give superior results with core boxes possessing large, open ends. Where side-branches in the box were at difficult angles, however, they could not be filled by this method and it was then decided that an air-blowing technique would have a better chance of success. The difficulty with this was the tendency of the sand and resin to separate in the course of being blown by reason of their differing densities. Various adjustments to overcome this were made to the equipment, however, and after much experimentation it was found that by adopting a tubular container for the mixture, with a 4 in. – 1 in. bell socket attached to its lower end and an air valve to control the flow, good shell cores of different types could be produced. Complicated cores were blown without further modification to the equipment and all cores were closely compacted, smooth and free from rough patches.

This development has been described in some detail because it represents an important new stage in the shell-moulding process, and also because it typifies the work that goes on before a vital new industrial application of plastics becomes established in common use.

(Right) This model of Henley Church Tower, cast in shell moulds by Stuart Turner Ltd., shows the fine detail which can be obtained by this method.





Three types of machines for producing shell moulds. (Left) A Sutter machine in use at Messrs. T. Blackburn & Sons ; (Centre) An Autoclino made by Clino Foundry Supplies Ltd.; (Right) A Shelmolda Duplus built by Fairbairn Lawson Coombe Barbour Ltd.

Armoured signalling cable for a Lancashire colliery consisting of 72 copper conductors, insulated and sheathed with VYBAK compounds in many colours.

Current Practice

'VYBAK' COMPOUNDS FOR CABLE PRODUCTION

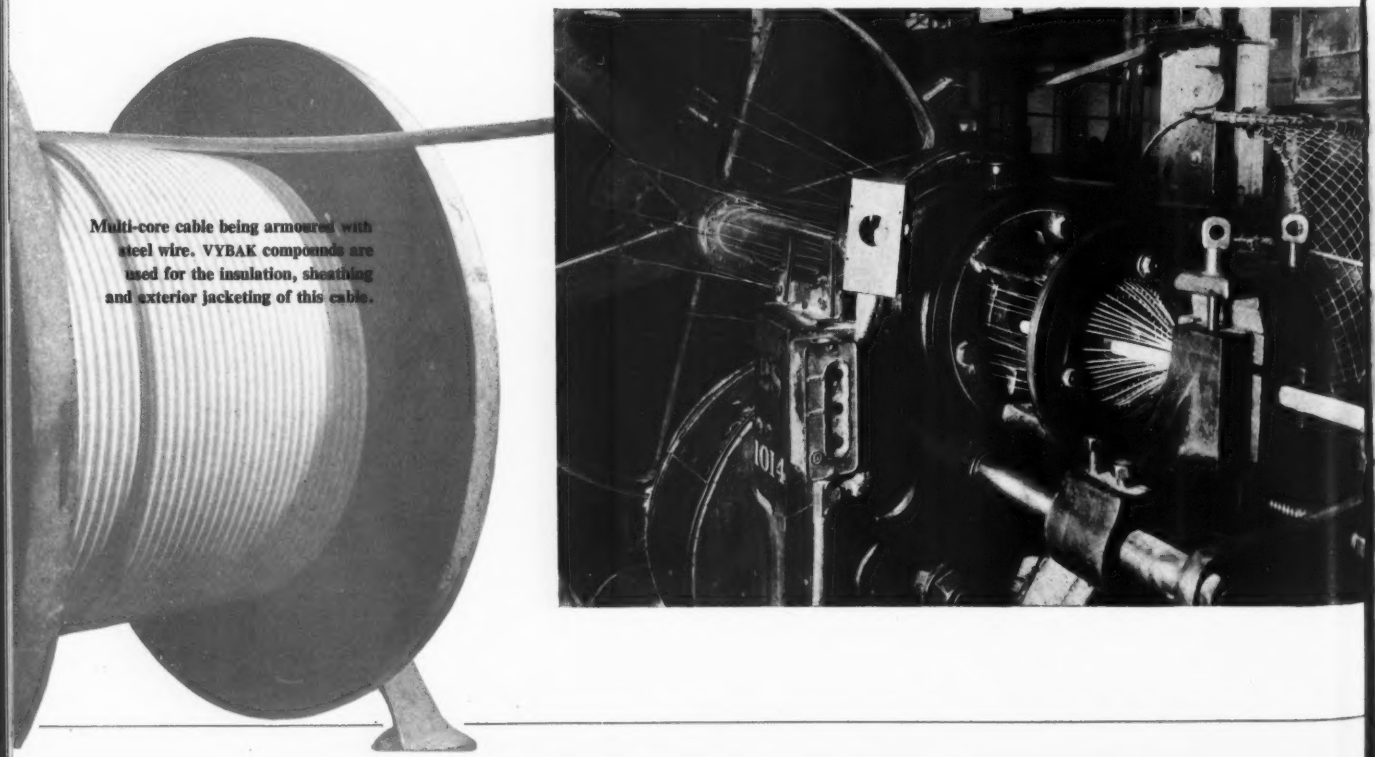
WHILST VYBAK p.v.c. materials are to-day supplied in many different forms — as resins, moulding compounds, calendered sheet, etc. — and have been put to a wide variety of new uses in the post-war era, it remains true that their original application in the U.K. for electrical cable insulation and sheathing is still one of their biggest sources of consumption. This field indeed represents one of the most important for the newer types of plastics, and the reasons for their continually increasing popularity are not far to seek. Whilst there is much to commend rubber for such purposes, and in certain properties, particularly mechanical ones, it can be made superior to any plastics which are available to-day, it also suffers from serious disadvantages. To take but one example, it often requires some form of external covering in the form of treated fabric or lead to protect it from chemical attack, and the first of these is itself subject to rotting, whilst the second is both weighty and susceptible to corrosion.

Even before the war there was an urge to improve upon the characteristics of rubber, and the war years themselves of course gave a great impetus to the adoption of p.v.c. as a replacement for the natural materials lost in Malaya and elsewhere. Like other plastics in their time, however, p.v.c. has also suffered to some extent through being initially regarded as a mere substitute. As such, it tended to be blamed if it failed to act in exactly the same way as rubber or proved recalcitrant when processed in identical conditions on existing machines. It was only on more mature reflection that it came to be regarded as a material in its own right, requiring its own special techniques, and the advantages it had to offer were then more readily appreciated.

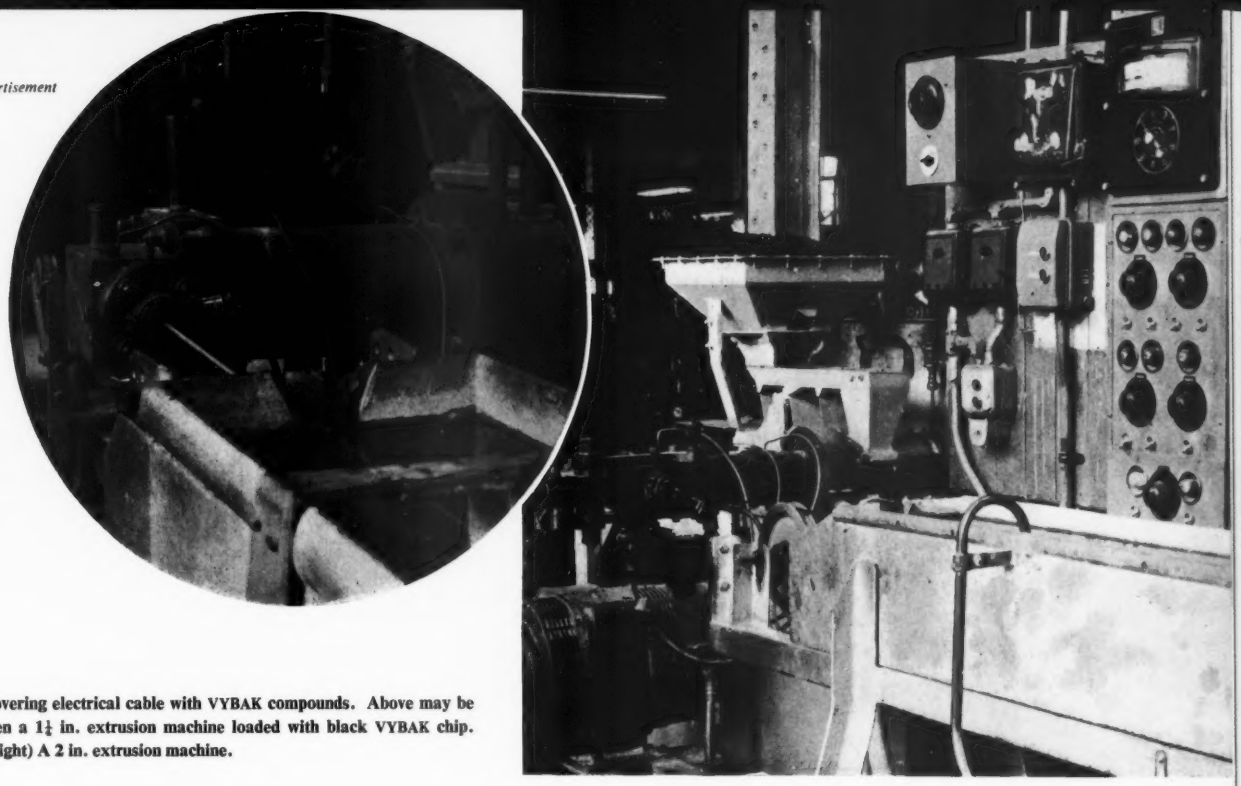
For the cable manufacturers these thermoplastics make life considerably easier. Rubber comes into the works in the form of large bales and has to be cleaned, cut up into small blocks and heat-conditioned before further processing. Subsequently it requires the addition of various inert and reinforcing filling ingredients, processing aids, vulcanising agents, etc., which necessitate mixing, milling and calendering. After application to the conductor or cable the rubber compound must then be vulcanised, and in many cases further coverings are required for protection.

VYBAK p.v.c. compounds by contrast are supplied in the form of chips in any chosen colour ready for feeding into the extruder, where they flux under heat and then stiffen rapidly on emergence from the die. No after-treatment at all is required for them and, apart from other considerations, they are considerably cleaner to handle, so that workshop conditions are improved.

It could of course be argued that this comparison is unfair because p.v.c. extrusion compounds have



Multi-core cable being armoured with steel wire. VYBAK compounds are used for the insulation, sheathing and exterior jacketing of this cable.



Covering electrical cable with VYBAK compounds. Above may be seen a 1½ in. extrusion machine loaded with black VYBAK chip. (Right) A 2 in. extrusion machine.

already been subjected to elaborate processing before they reach the cable manufacturer, and that this stage is the logical equivalent of the rubber preparation which has been described. Undoubtedly there is truth in this, and no-one who has seen the plant in which vinyl resins are produced, would dream of under-stating the complexity of the process. The fact remains, however, that from the cable-maker's point of view they are supplied ready for use and are therefore much easier for him to handle.

Compared with polythene — the other plastics widely used for cable covering — p.v.c. is inferior in electrical characteristics. The dielectric strength and power factor of the former are indeed better than those of any other material at present commercially available. At the same time the electrical properties of p.v.c. are fully adequate for low and medium voltages, whilst its mechanical properties are generally superior to polythene, and it is therefore used in large quantities on cables intended for domestic and industrial installations and, in particular, for the wiring of electronic and radio equipment, telephone switchboards, motor car harnesses, etc.

Both these materials have excellent resistance to chemical attack, and in this respect display another of their major advantages over rubber. P.v.c., for example, has very good ageing and weathering characteristics and, suitably compounded, is highly resistant to oxidation and the action of light and ozone, as well as to water, most acids and alkalis, oils, petrol and solvents. It is tough and flexible, with a tensile strength of the same order as high-quality rubber and, unlike polythene, does not support combustion. It is in fact flame-retardant, and, when removed from the source of combustion, is self extinguishing. This is an extremely valuable characteristic which has led to the material's adoption in mines and similar situations where fire hazards are particularly vital.

From this comparison it will be seen that these two plastics for cable covering, each with their individual advantages, are in many ways complementary to one another, and they are in fact often used in combination by Mersey Cable Works Limited, by whose courtesy the illustrations on these pages are shown. This Company produces a wide range of cables for all purposes ; mining, industrial, domestic, shipping, communications, etc., and, whilst one of its standard types, the "Mervyn" range of cables, employs VYBAK p.v.c. compounds for both the insulation and sheathing, a second similar range of "Merthene" cables uses polythene for the insulation and p.v.c. for the external sheathing.

Because of the reasons given, plastics, including certain still newer types, may therefore be looked upon as the up-to-date materials for electrical cable manufacture over a wide field, and VYBAK compounds are made to conform to the relevant British Standard and Government specifications. They permit cables to be produced with the smallest possible dimensions consistent with good electrical and mechanical characteristics and, for installations involving many leads, the bright, permanent colours in which they are supplied simplify identification. Thus, for both cable-maker and cable-user, plastics have spelt improvements, and that this writing on the wall has been read is shown by their ever increasing adoption in this sphere.

Bakelite PROGRESS

SIXTEEN PAGES OF PROGRESS IN THE PLASTICS WORLD

Some of the current uses and recent developments in BAKELITE, VYBAK & WARERITE Plastics are outlined in this sixteen-page review. On Stand No. 74 at the British Plastics Exhibition are displayed many other examples of the progress made possible by the partnership of the Bakelite Organisation and Industry. Manufacturers are invited to visit us at the Exhibition to discuss any production problems that plastics might solve.

BAKELITE
VYBAK
WARERITE
PLASTICS

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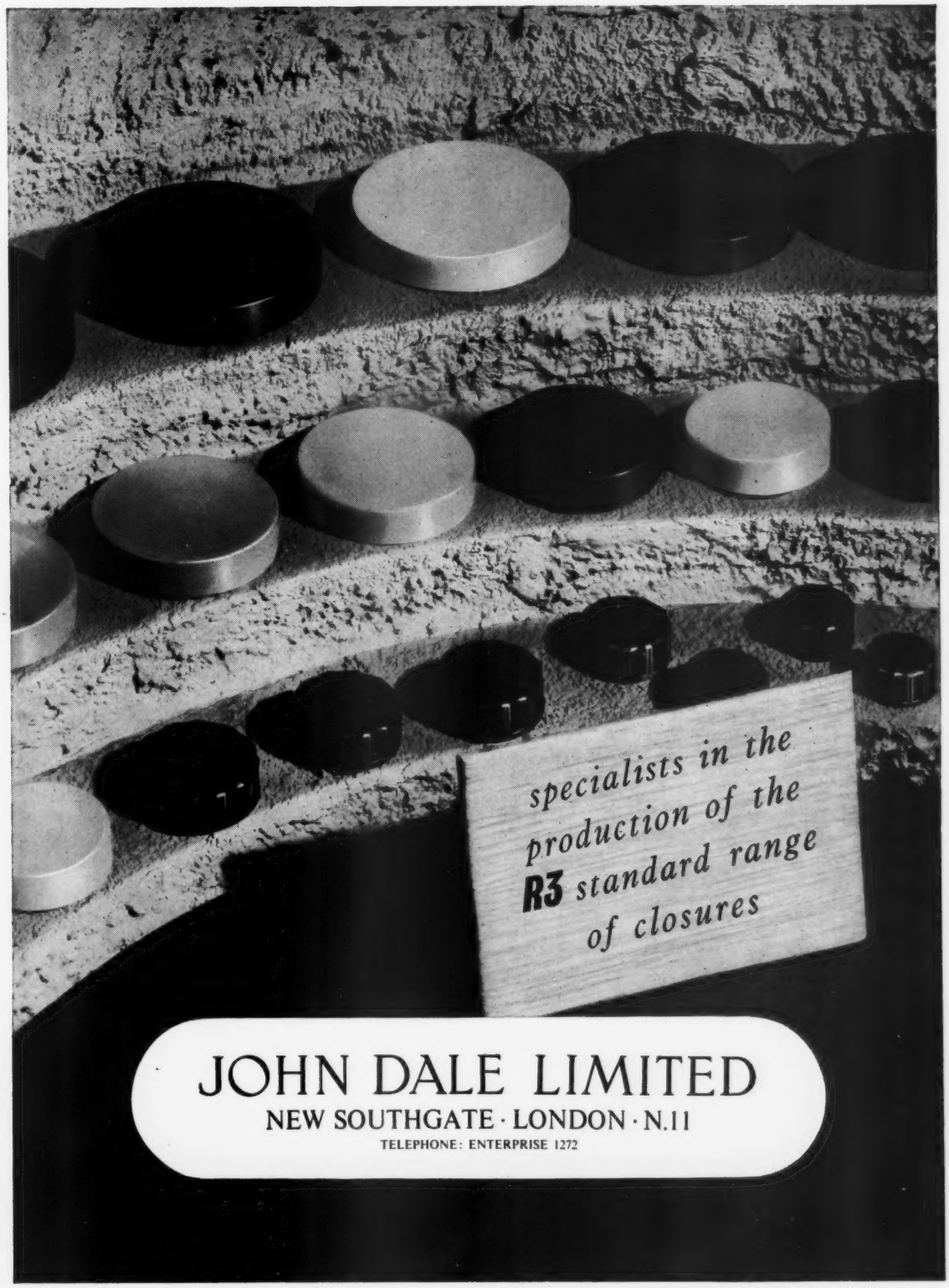
Works
BIRMINGHAM . AYCLIFFE . . WARE

Countries in which Bakelite Limited is represented overseas

ARGENTINA	CYPRUS	GREECE	MEXICO	SPAIN
AUSTRALIA	CHILE	HOLLAND	MOROCCO	SWEDEN
AUSTRIA	CHINA	HONG KONG	NEW ZEALAND	SWITZERLAND
BELGIUM	DENMARK	INDIA		SYRIA
BRAZIL	EGYPT	ITALY	NORWAY	THAILAND
BRITISH GUIANA	EIRE	LEBANON	PAKISTAN	TUNIS
	FRANCE	LIBYA	PARAGUAY	TURKEY
BRITISH WEST INDIES	FRENCH UNION	LUXEMBOURG	PORTUGAL	URUGUAY
		MALAYA	SINGAPORE	VENEZUELA
CEYLON	GIBRALTAR	MALTA	SOUTH AFRICA	YUGOSLAVIA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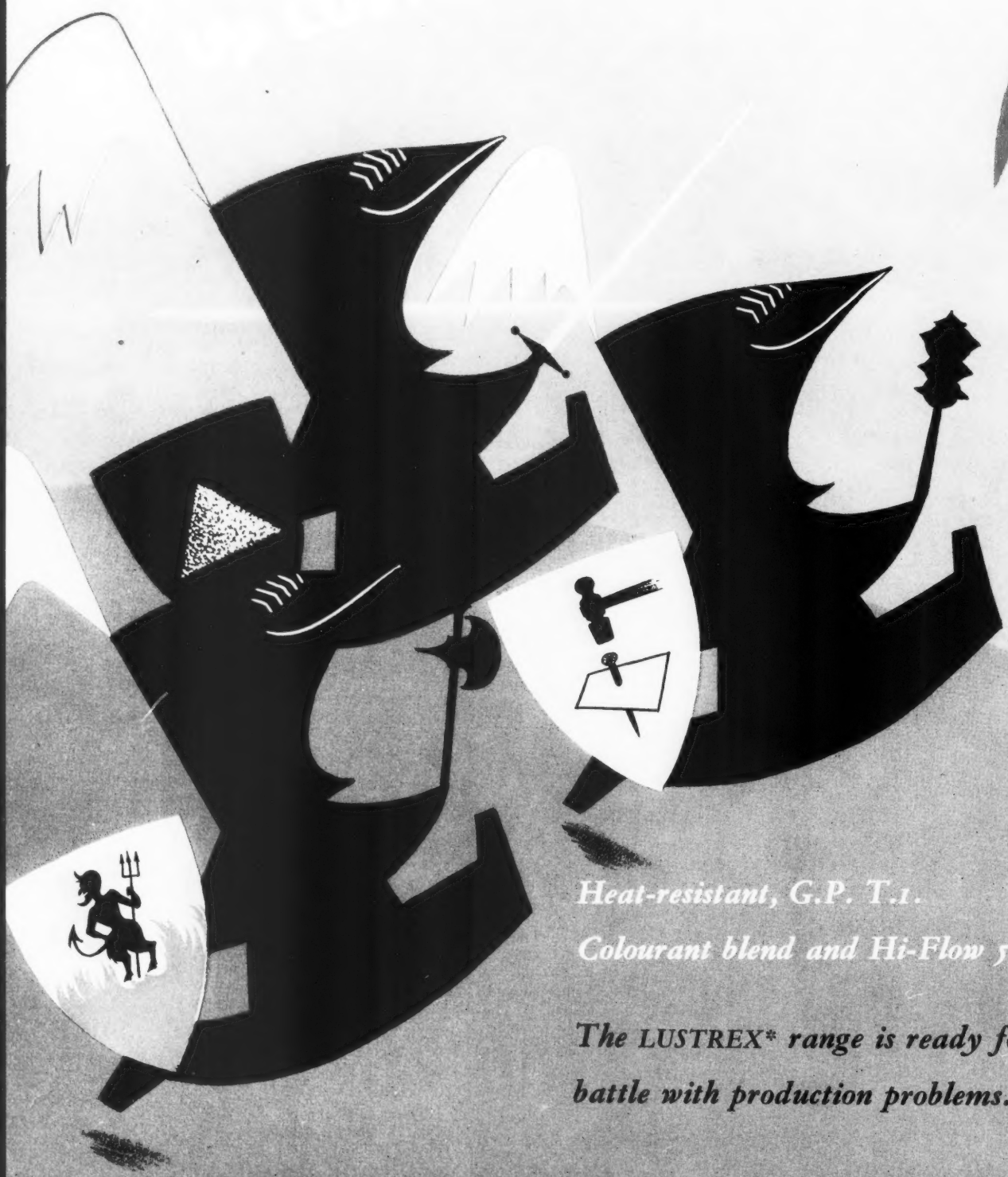

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Colourant blend and Hi-Flow 55.

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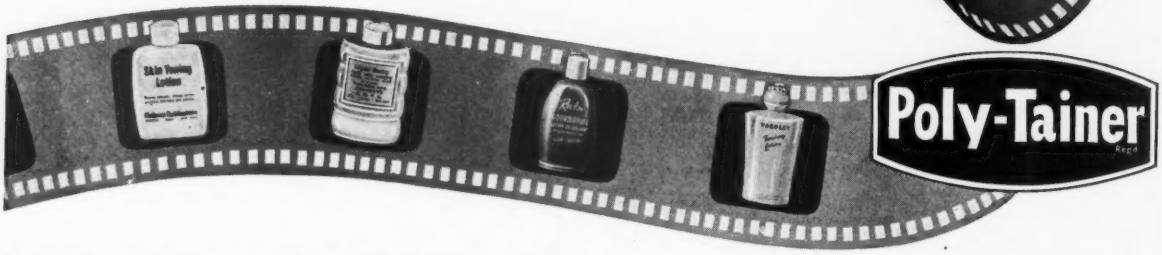

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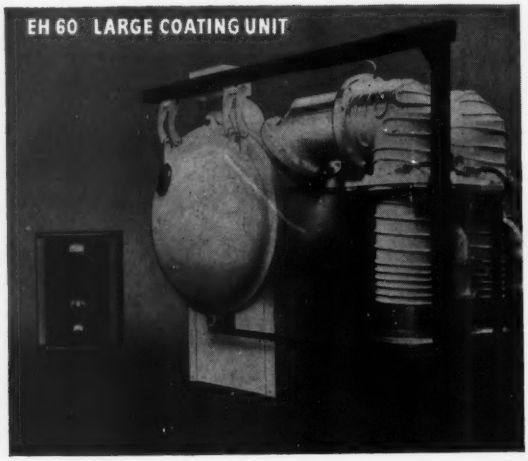
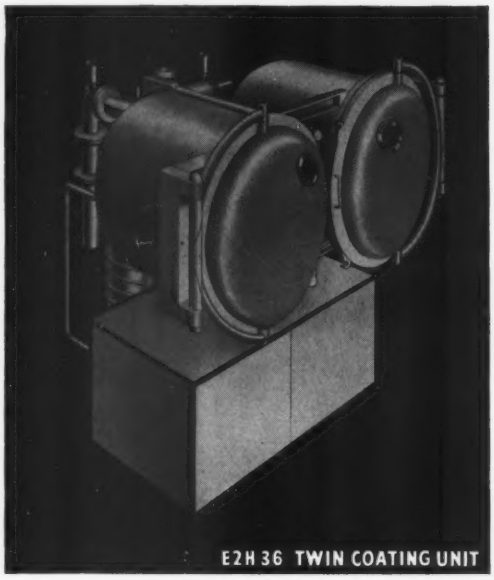
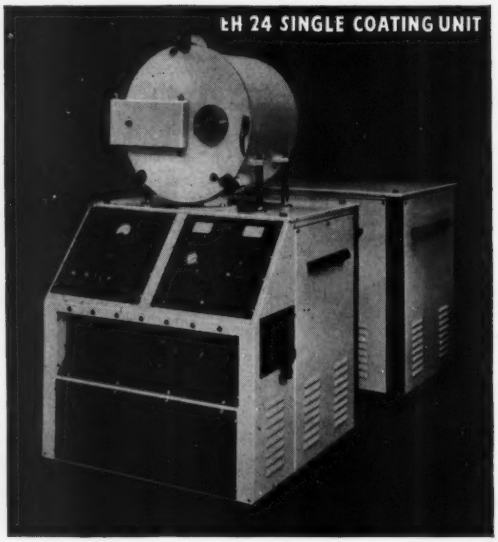

EH 60 LARGE COATING UNIT


E2H 36 TWIN COATING UNIT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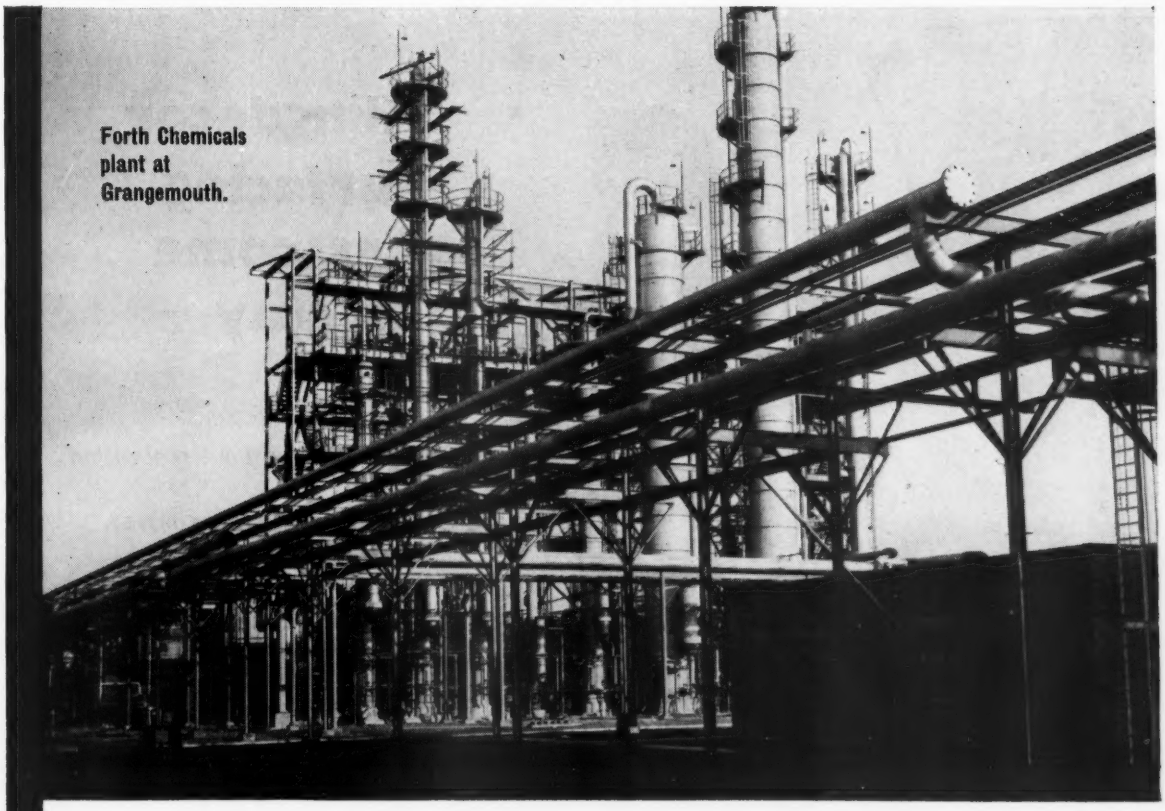

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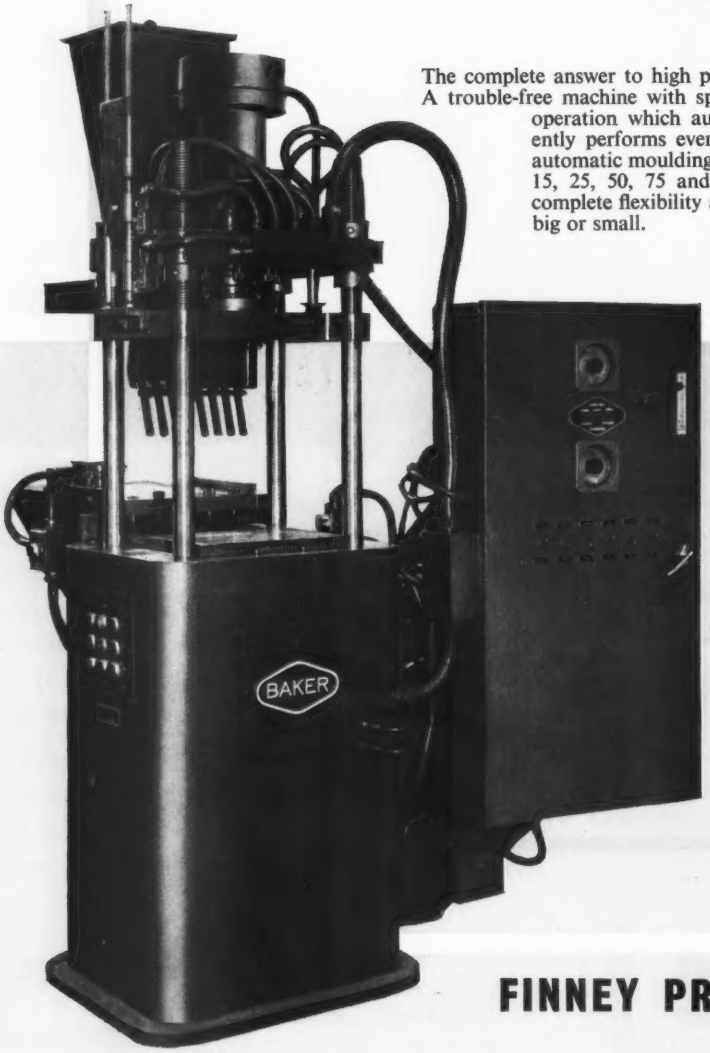

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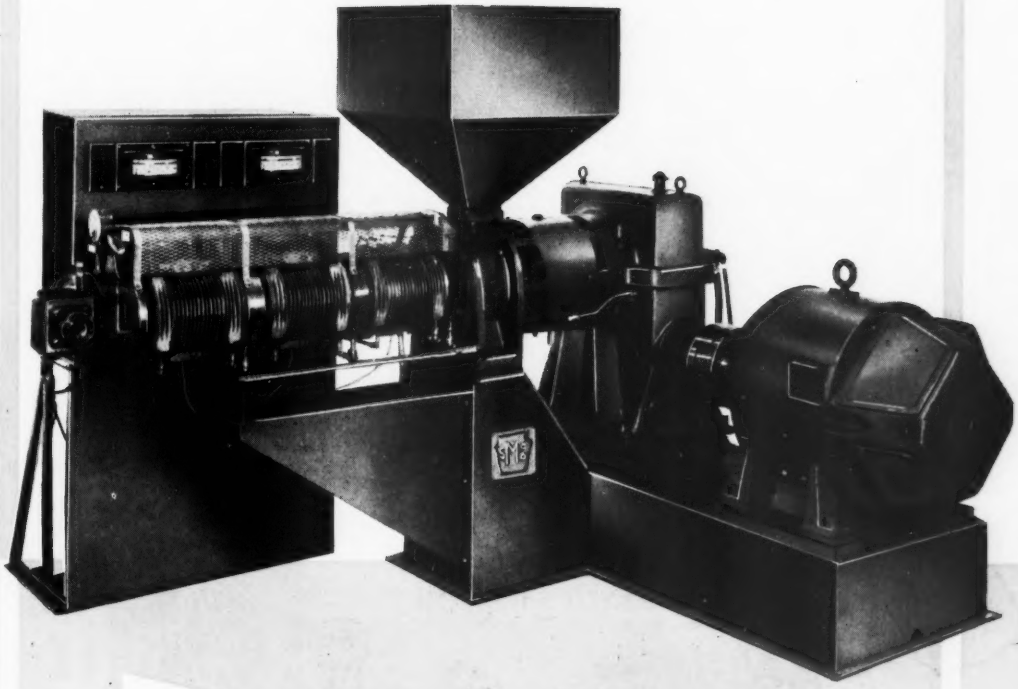

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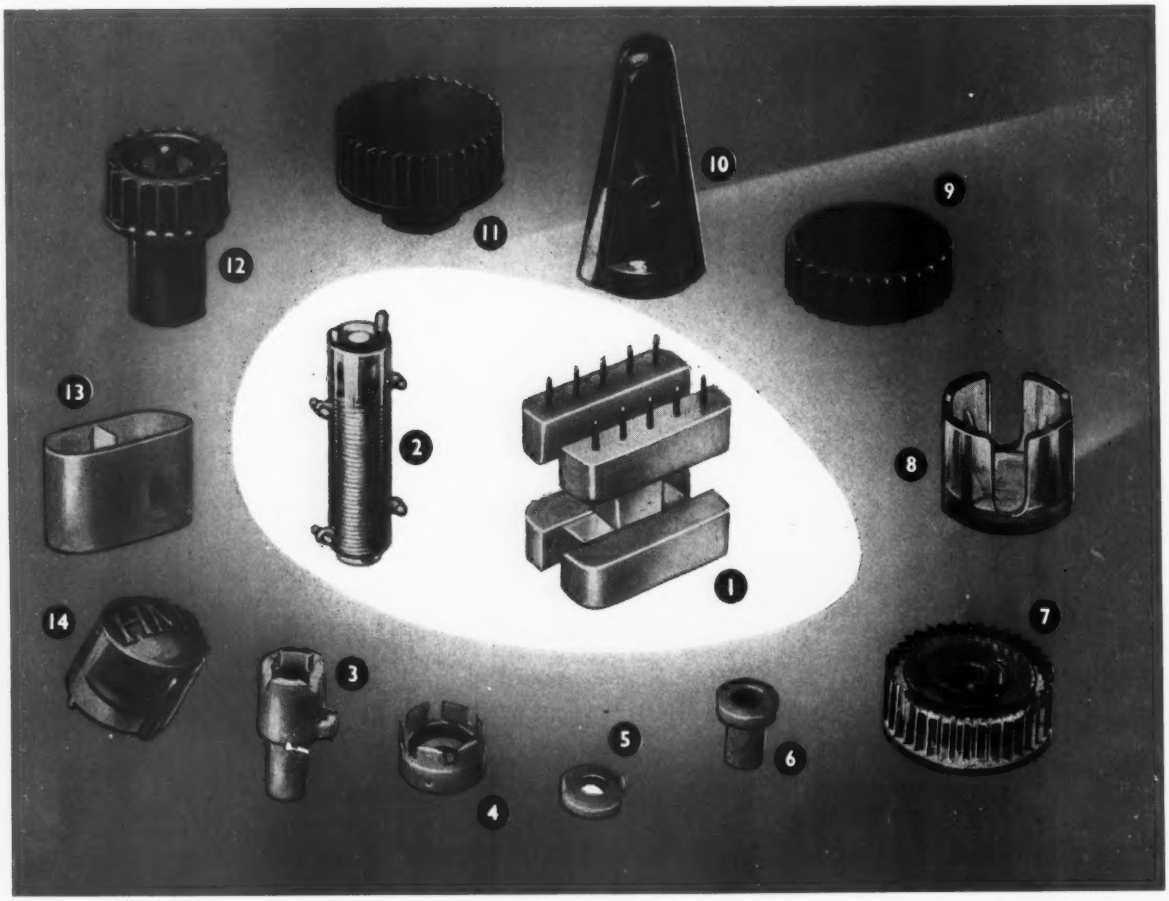

1 Shows a very intricate and difficult moulding in translucent nylon with steel and brass inserts of a coil former for magnetic relays. We would mention that two reputable injection moulders pronounced this as an impossible proposition for injection mouldings. It is nevertheless, now being successfully produced by us in quantity.

2 *Coil Former in Clear Polystyrene for Radios.* This moulding has 34 fine pitch internal threads and is produced within very close tolerances.

3
4
5
6 Component parts for coil former assembly in heat resistant polystyrene.

7 Control knob for radio and television in clear polystyrene.

8 Battery cap in clear polystyrene.

9 Screw cap for battery top in red cellulose acetate.

10 Pick-up rest in brown high-impact polystyrene.

11
12 Control knob for radio in brown polystyrene.

13 Miniature battery holder in polystyrene.

14 Electric iron indicator lamp cover in green transparent cellulose acetate.

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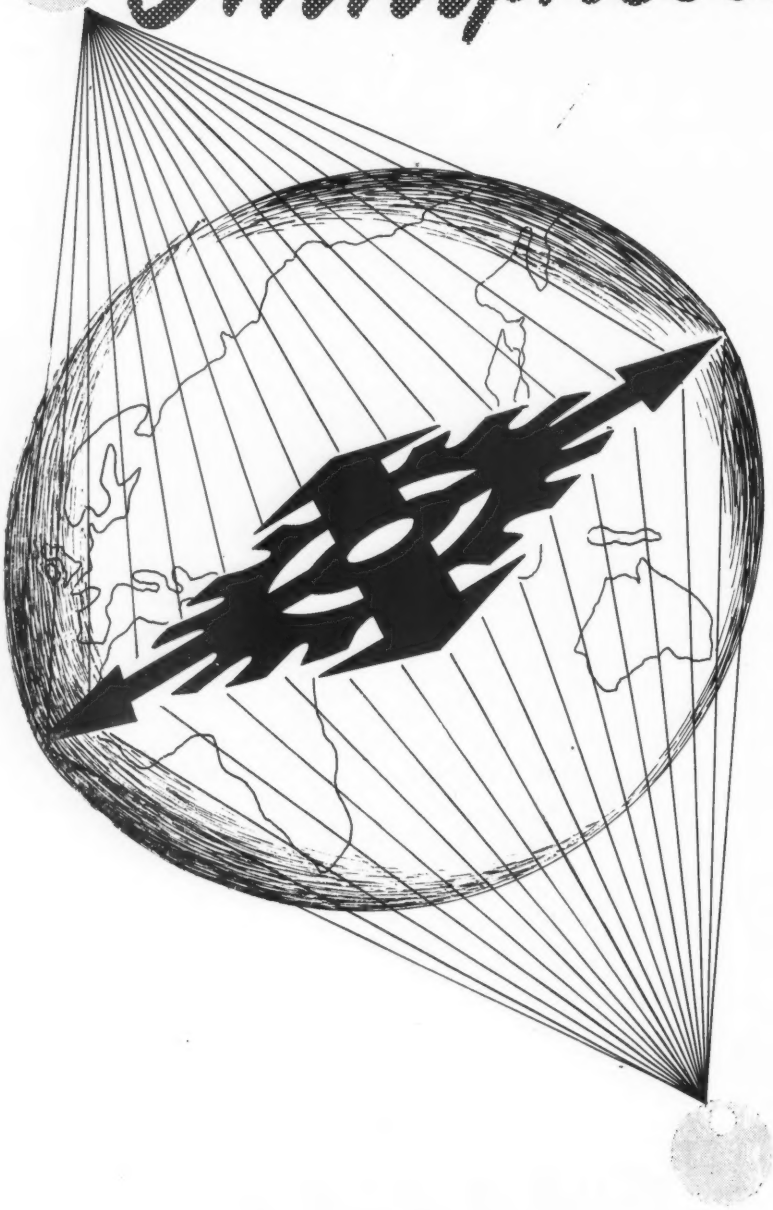

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It's a woman's world—

WITH

'Celastoid'

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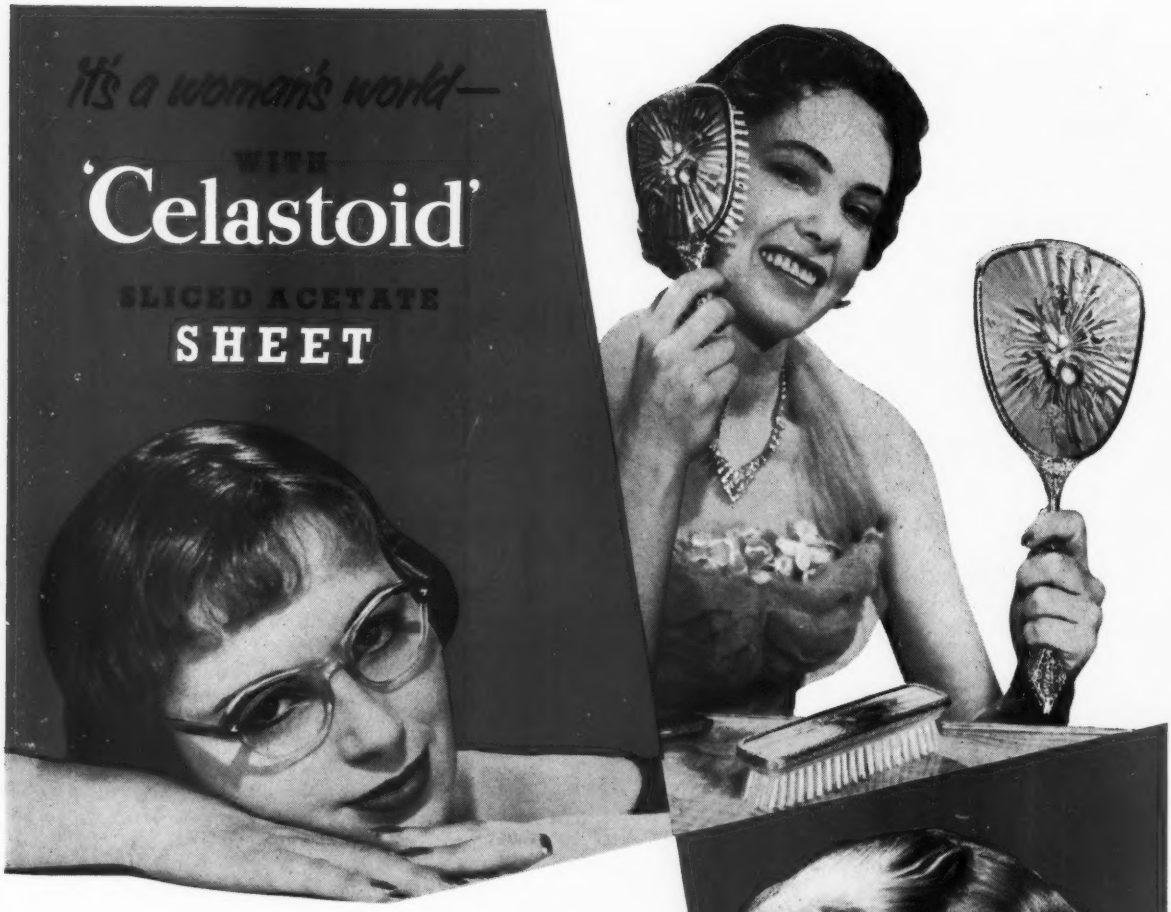

and a man's too!

More and more manufacturers are using 'Celastoid' sheet because . . .

Because **'Celastoid'** is easily formed and does not chip, snap or crack when machined.

Because **'Celastoid'** is ideal for high quality precision work and is used extensively for optical purposes, combining utility with beauty.

Because **'Celastoid'** is shatterproof and tough. For visors, goggles and other safety purposes it is unrivalled.

Because **'Celastoid'** comes in accurately gauged sheets of many colours. It can be laminated for two-tone effects.

Doll by Britannia Toy Company Limited.
Spectacles by J. & R. Fleming.
Dressing Table Set marketed by Rowland (Birmingham) Limited, Shenstone, Staffs. Incorporating 'Raymoloid' Decorated 'Celastoid' inserts.

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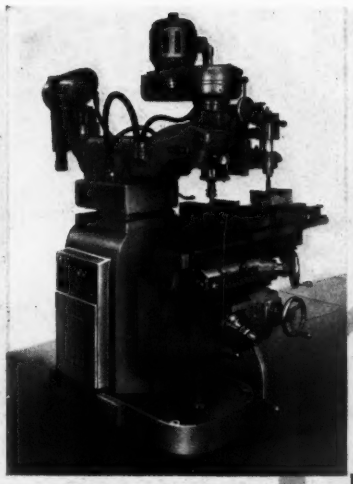
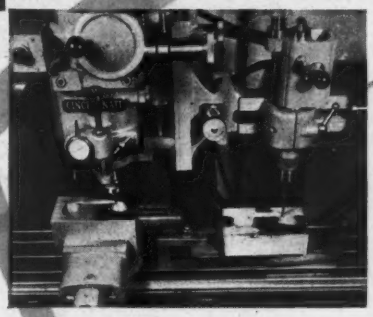
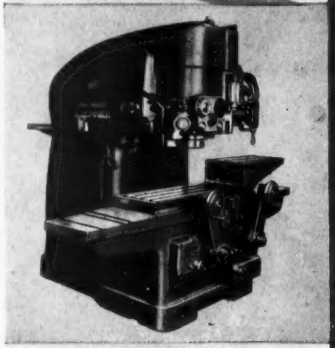


THE CINCINNATI 8" × 18" TOOL AND DIE MILLING MACHINE has all the features necessary for rapid, accurate and economical production of small moulds and dies from almost any type of master. The illustration shows a left-hand die being made from a right-hand master.

Milling a die for a toy telephone receiver, using a plastic master. The 8" x 18" Tool and Die Miller is described in catalogue M-1620-E.

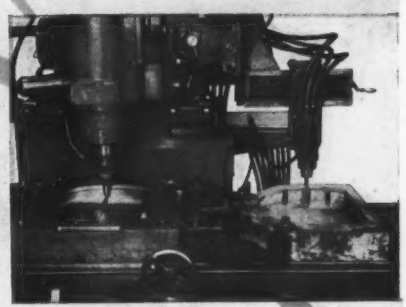


CINCINNATI MACHINE TOOLS for the PLASTICS INDUSTRY



CINCINNATI 16" VERTICAL HYDROTEL for machining medium to large sized moulds. Catalogue M-1497-E.

May we tell you more about these Cincinnati Machine Tools? The catalogues contain complete information on their features and the important advantages they offer to the plastics industry.



Milling a large die from a plaster master, on a **CINCINNATI 25" VERTICAL HYDROTEL**. Catalogue M-1773.

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Sales Representatives for Great Britain and Northern Ireland:
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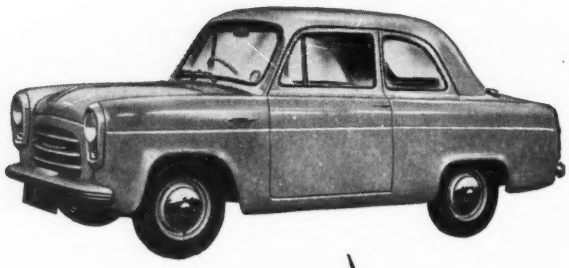

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101 Spire speed nuts are used in the Ford Anglia.

Compared with conventional bolt and nut methods which involve welding, riveting and threaded inserts, Spire parts speed up the assembly enormously—especially in blind locations. They hold fast under vibration and save a good deal of weight.

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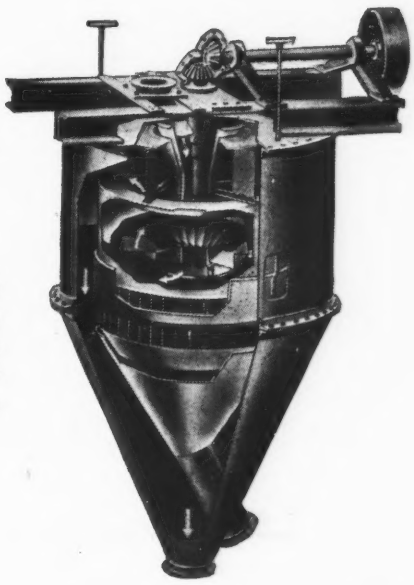

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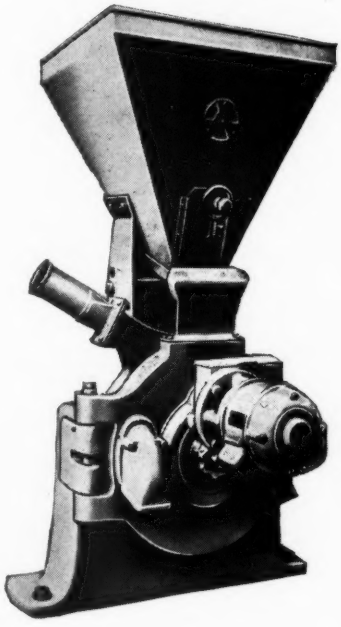

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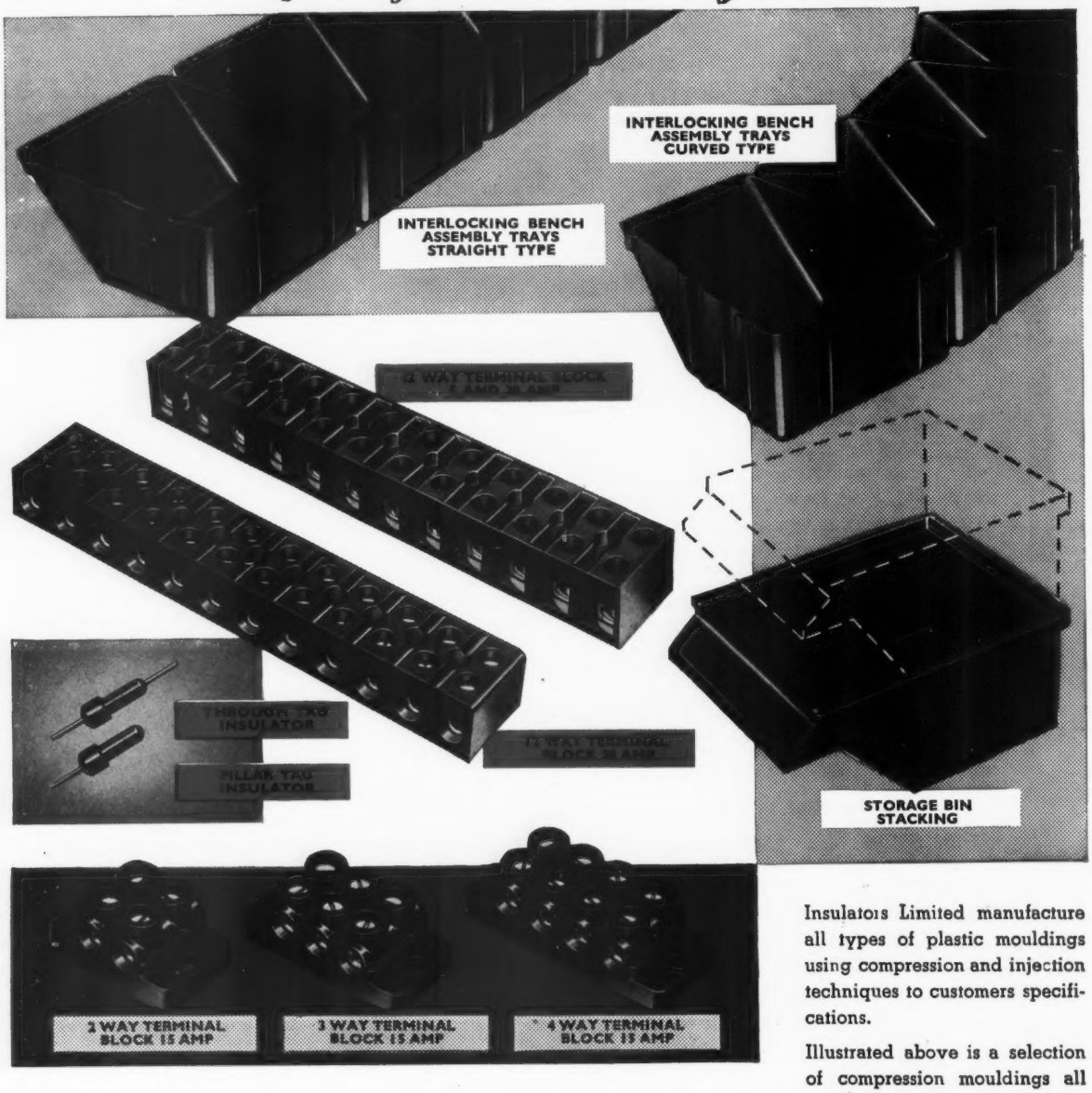
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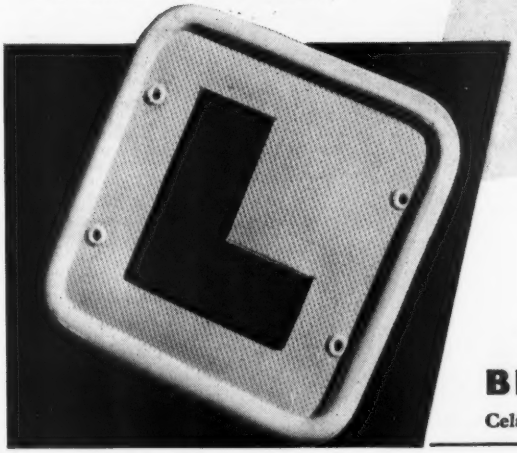

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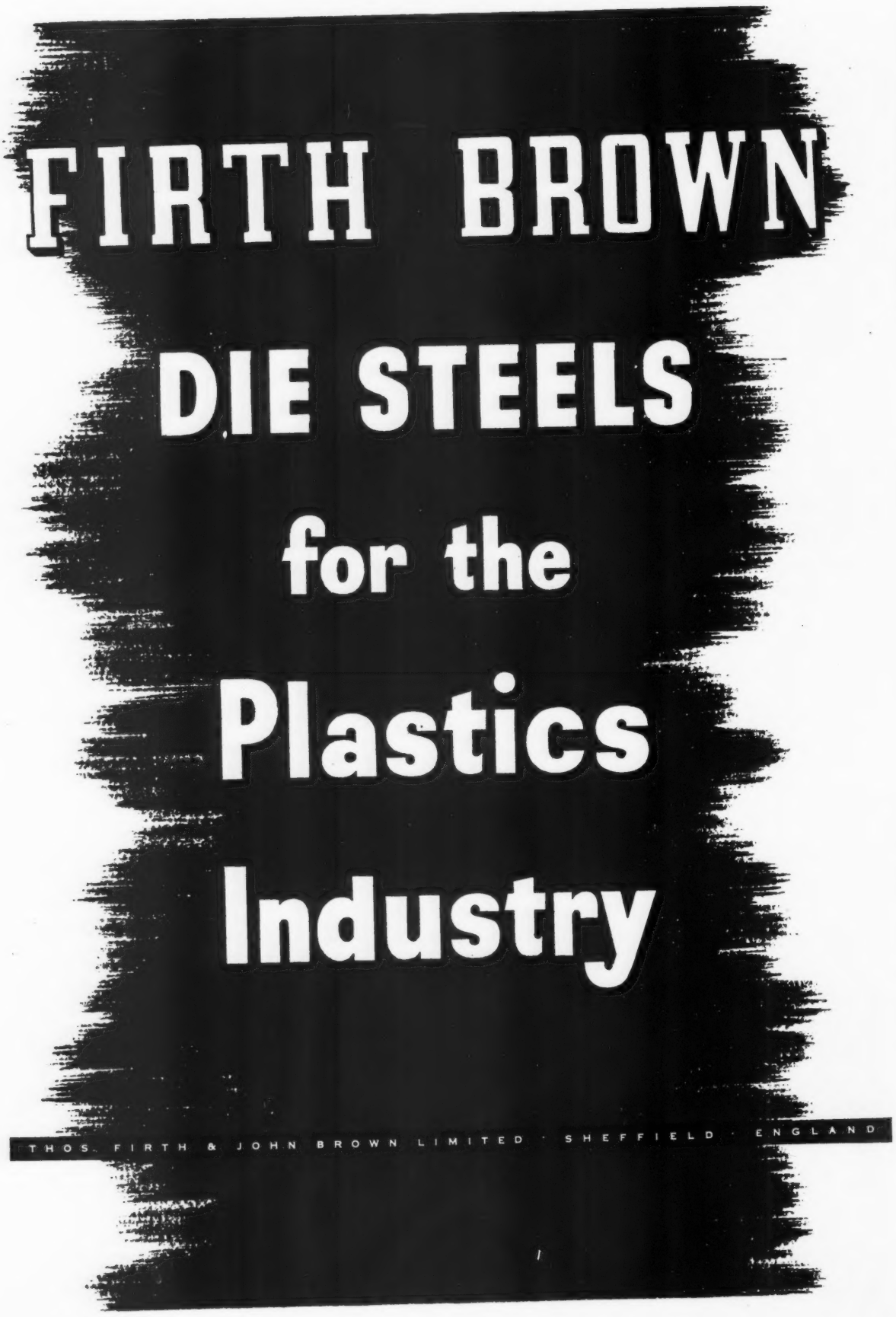
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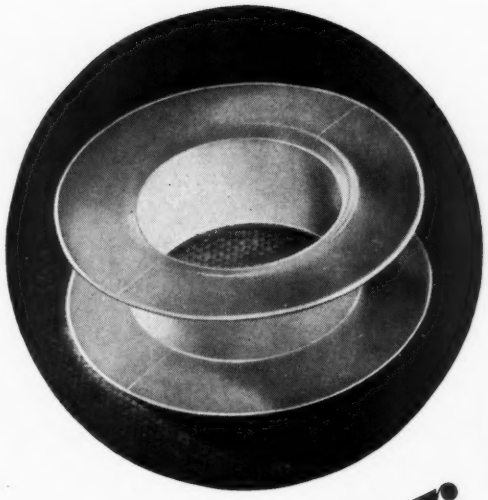
Industry
THOS. FIRTH & JOHN BROWN LIMITED · SHEFFIELD · ENGLAND



simple or intricate . . .

Simple coil winding bobbin or intricate high-precision part . . . whatever the job, we have the skill, experience and equipment to mould it accurately—in the most suitable plastic material. Our modern moulding shops are now among the largest in Europe. We can turn out injection mouldings of every description from the smallest to the largest. By replacing fabricated parts our mouldings have reduced manufacturing costs in scores of industries. It's more than likely we could save you money too! If you've a problem where a plastic moulding might help—*consult us.*

Here are some of the materials we handle . . .

THERMOSETTING
Phenol Formaldehyde, Urea Formaldehyde

THERMOPLASTIC
Cellulose Acetate, Cellulose Acetate Butyrate, Polymethylmethacrylate, Polystyrene including heat resisting and high impact grades, Nylon. **Flexible plastics:** Polyethylene, Polyvinylchloride

and here are a few of the processes we use . . .

COMPRESSION MOULDING

THERMOPLASTIC INJECTION MOULDING

TRANSFER MOULDING

THERMOPLASTIC BLOW MOULDING
Polyethylene bottles and other containers

FRASER
and
GLASS
the plastics people

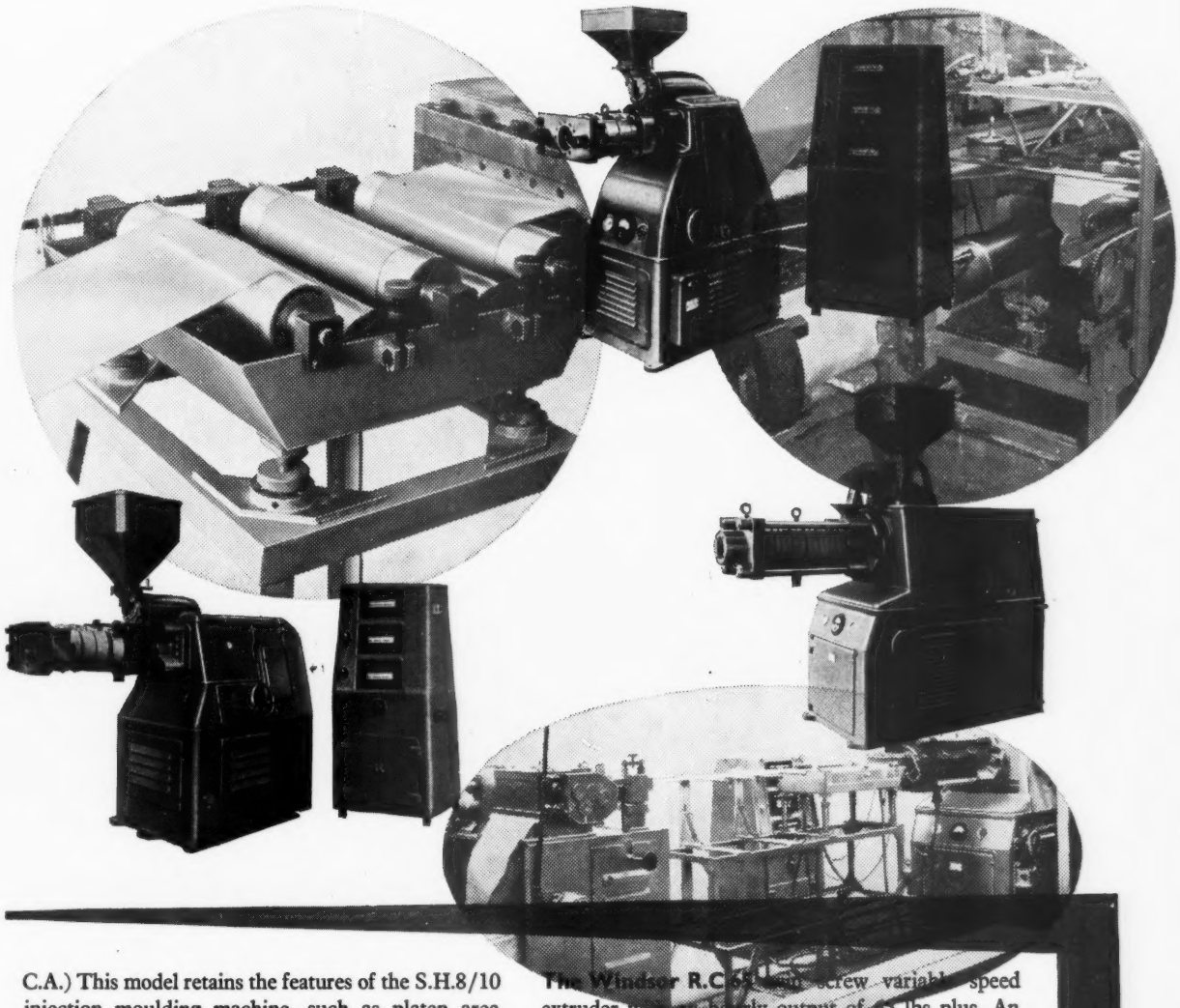
WOODSIDE LANE, LONDON N.12
(HILLSIDE 2224-5)

E

The Windsor S.H.4 fully automatic injection moulding machine will produce articles in a wide range of materials up to four ounces. Mould locking force 150 tons. A mould safety device is incorporated.

The Windsor S.H.8/10 injection moulding machine will produce up to 12 ounce shots. A 300 ton lock and large mould plates ensure a wide production range.

The Windsor 1044 Autoplas Pre-Plasticiser capable of moulding up to 44 cubic inches. (32 ounces



C.A.) This model retains the features of the S.H.8/10 injection moulding machine, such as platen area 29″ × 25″ and the 25 h.p. motor drive, whilst giving a trebled capacity.

The Windsor R.C.100 twin screw extruder is a medium capacity machine with a nominal output of 100 lbs. per hour and will produce tubes, rods and profile in most of the thermo-plastics materials.

The Windsor R.C.65 twin screw variable speed extruder with an hourly output of 65 lbs plus. An automatic feeding device for metering plastics material to the screws is incorporated.

The Windsor R.C.200 triple screw extruder, with a nominal output of 200 lbs. per hour plus. Particularly suitable for pelletising of thermo-plastics materials such as polystyrene, elastomeric P.V.C., etc.

★ Another Pre-plasticiser injection moulding machine, the **2044 AUTOPLAS,** is also available. It again offers 44 cubic inches injection capacity, but has a large powerful toggle unit giving a 600 ton lock and platen area of 38″ × 34″.

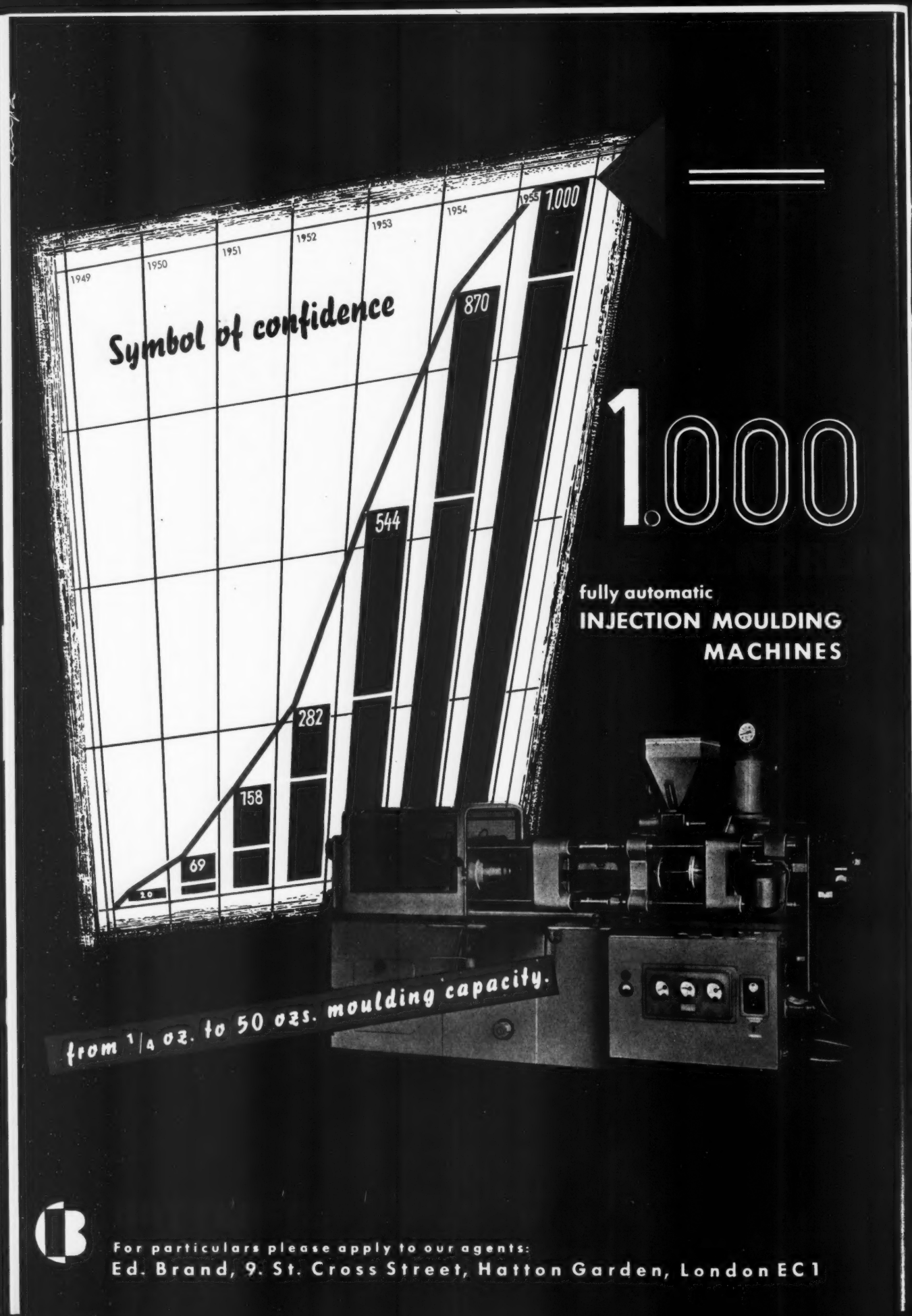
STAND NO. 34 AT THE BRITISH PLASTICS EXHIBITION

R.H. Windsor LTD

SERVING THE WORLD'S PLASTIC INDUSTRY Windsor PLASTICS MACHINERY TRADE MARK

HEAD OFFICE AND WORKS · LEATHERHEAD ROAD · CHESSINGTON · SURREY

Telephone: Epsom 5631. Telegrams: "WINPLAS" Chessington, Surrey. London Office: 49 Upper Brook St., London, W.1. Telephone: Mayfair 9020 (12 lines).

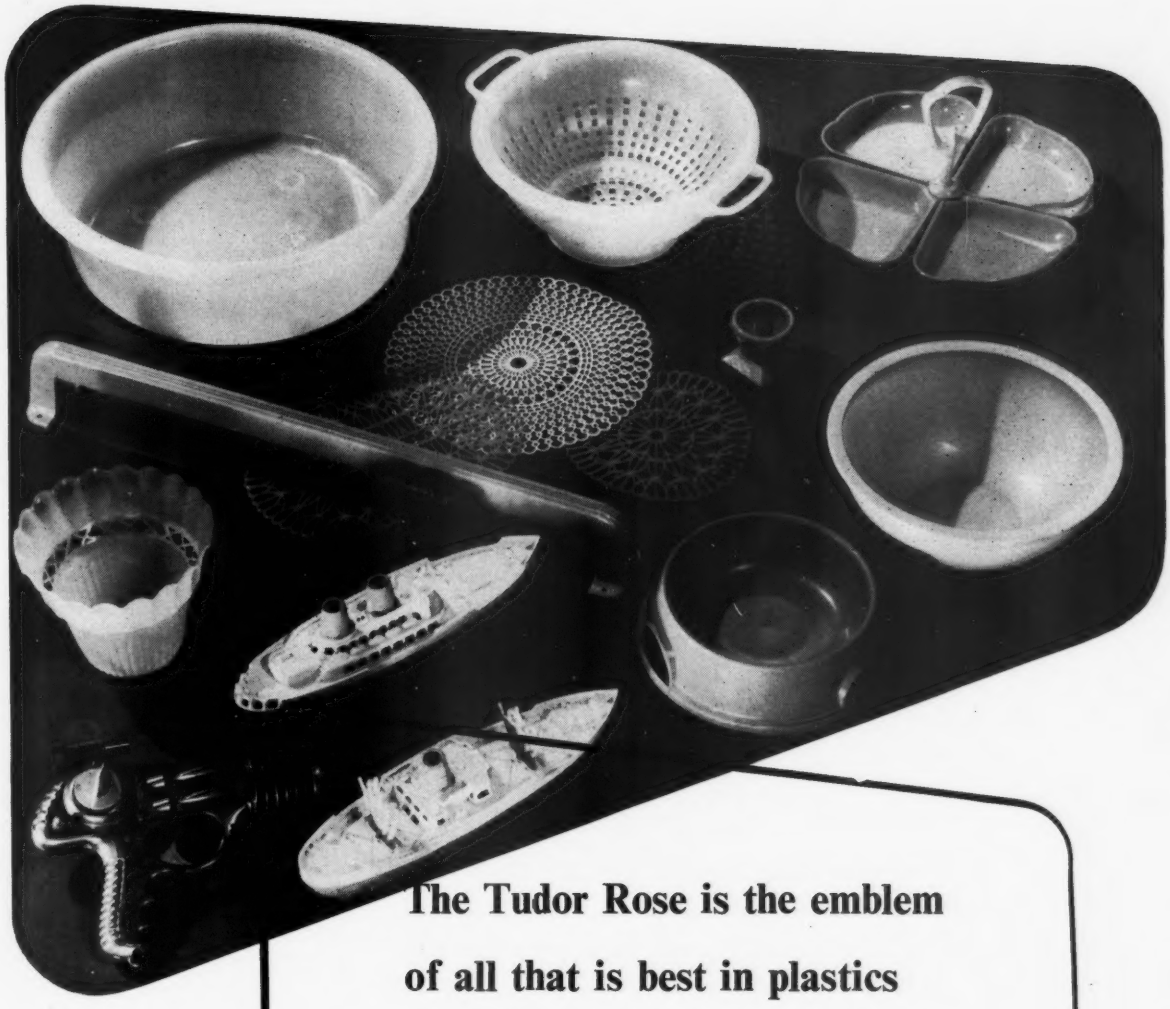


1.000

fully automatic
INJECTION MOULDING MACHINES

from 1/4 oz. to 50 ozs. moulding capacity.

For particulars please apply to our agents:
Ed. Brand, 9. St. Cross Street, Hatton Garden, London EC1



The Tudor Rose is the emblem
of all that is best in plastics
throughout the world.
See for yourselves
on Stand No. 33.

TUDOR ROSE PLASTIC PRODUCTS

ROSEDALE

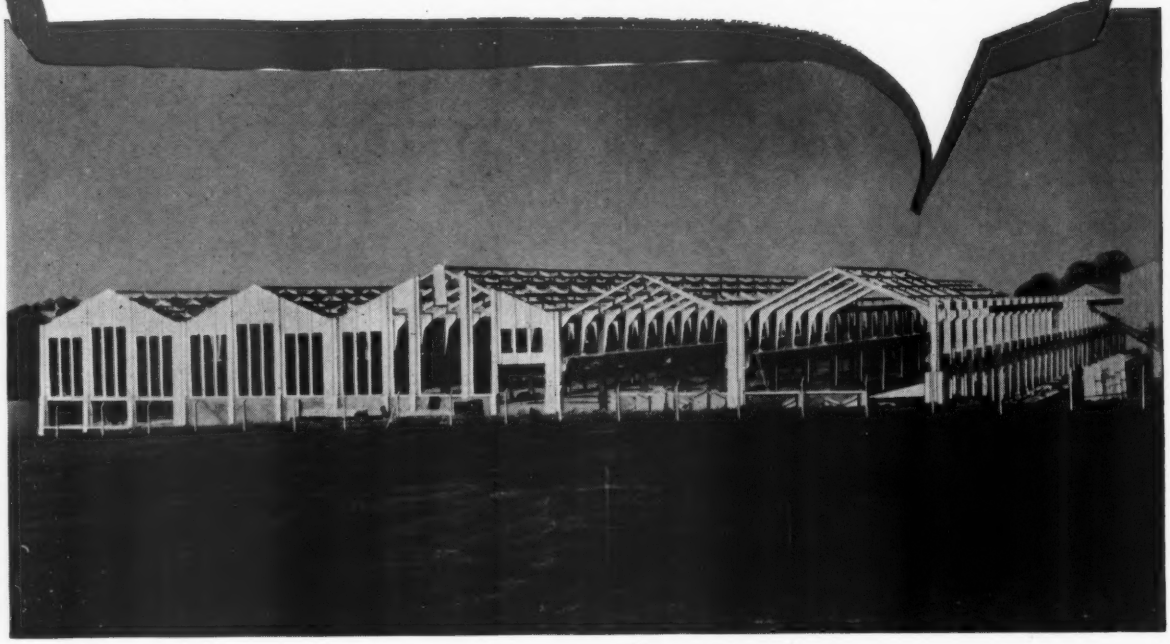
THE ROSEDALE GROUP OF COMPANIES

11 Upper Grosvenor Street, London, W.1

STAND No. 33

A GUARANTEE has been given by Beecham Buildings Ltd. to complete a new factory of 200,000 sq. ft. and considerable intricate ancillary work for an Industrial organisation in the Midlands — within a year.

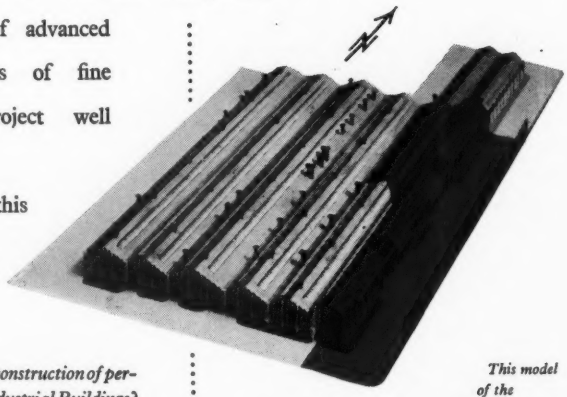
This is the sixth advertisement telling the story.



The goal is in sight!

Speed and efficiency, always inseparable from substantial progress, have brought this Beecham contract three parts of the way to successful completion. With 4½ spans erected, the job is racing ahead of schedule — thanks to scrupulous planning, the daily production of concrete components sometimes weighing 6 or 7 tons and the employment of advanced techniques that simplify fabrication. Future prospects of fine weather increase the possibility of finishing the project well within the guaranteed time.

Further advertisements will conclude the story of this contract — proving the worth of Beecham methods and a Beecham guarantee.



This model of the complete factory will pin-point progress in the advertisements which follow. Progress to date includes 150,000 cubic yards of excavation; perimeter roads, North extension, foundations and floors complete and 4½ spans erected.

Beecham Buildings

May we advise you on the construction of permanent and competitive Industrial Buildings?

BEECHAM BUILDINGS LTD

DEPT. K

SHIPSTON-ON-STOUR, WARWICKSHIRE

Telephone : Shipston-on-Stour 315, 316 & 3287

AP.211.51

There's Fresh Scope For Profit

in

Kleestron H

high impact polystyrene

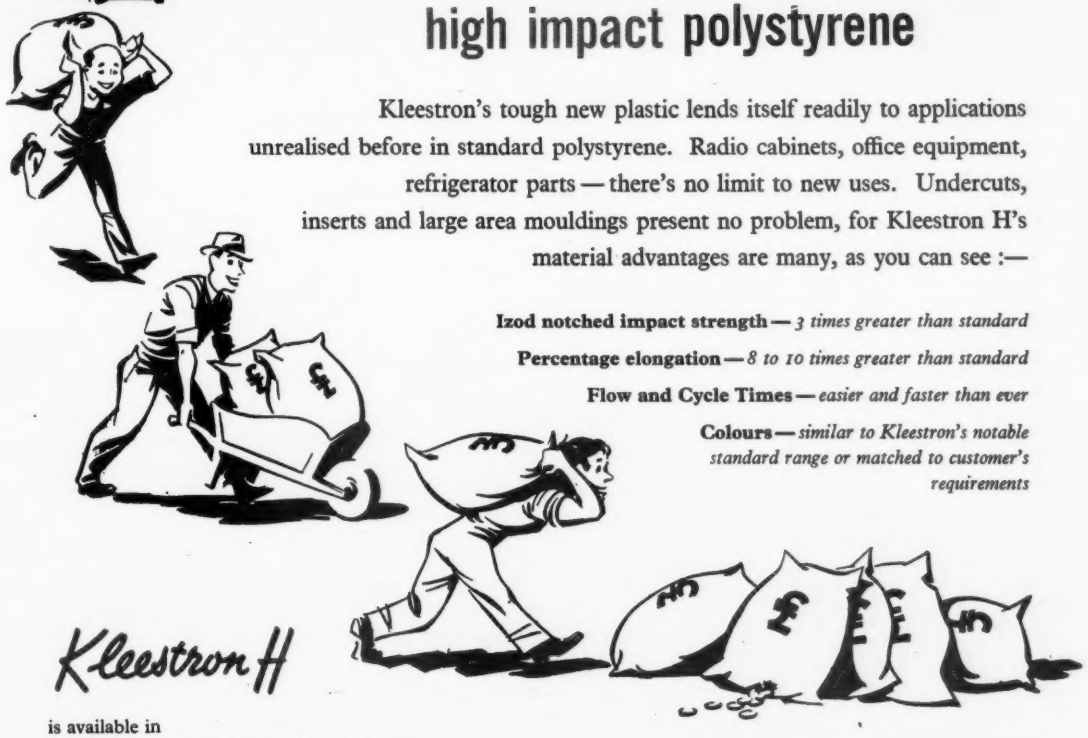
Kleestron's tough new plastic lends itself readily to applications unrealised before in standard polystyrene. Radio cabinets, office equipment, refrigerator parts — there's no limit to new uses. Undercuts, inserts and large area mouldings present no problem, for Kleestron H's material advantages are many, as you can see :—

Izod notched impact strength — *3 times greater than standard*

Percentage elongation — *8 to 10 times greater than standard*

Flow and Cycle Times — *easier and faster than ever*

Colours — *similar to Kleestron's notable standard range or matched to customer's requirements*

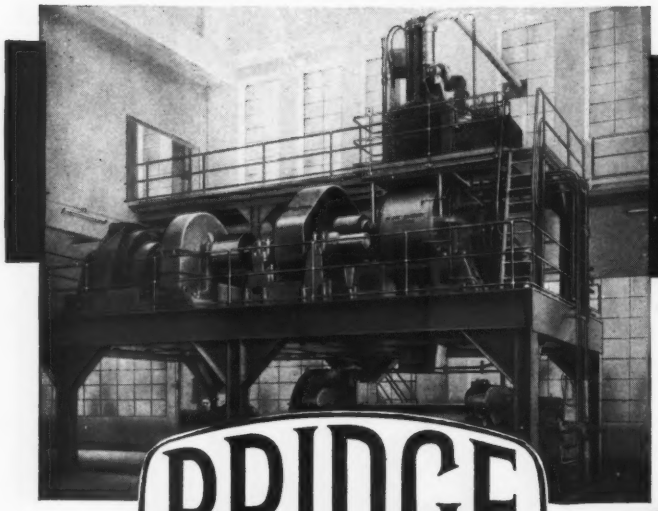


Kleestron H

is available in
extruded pellet form for injection moulding

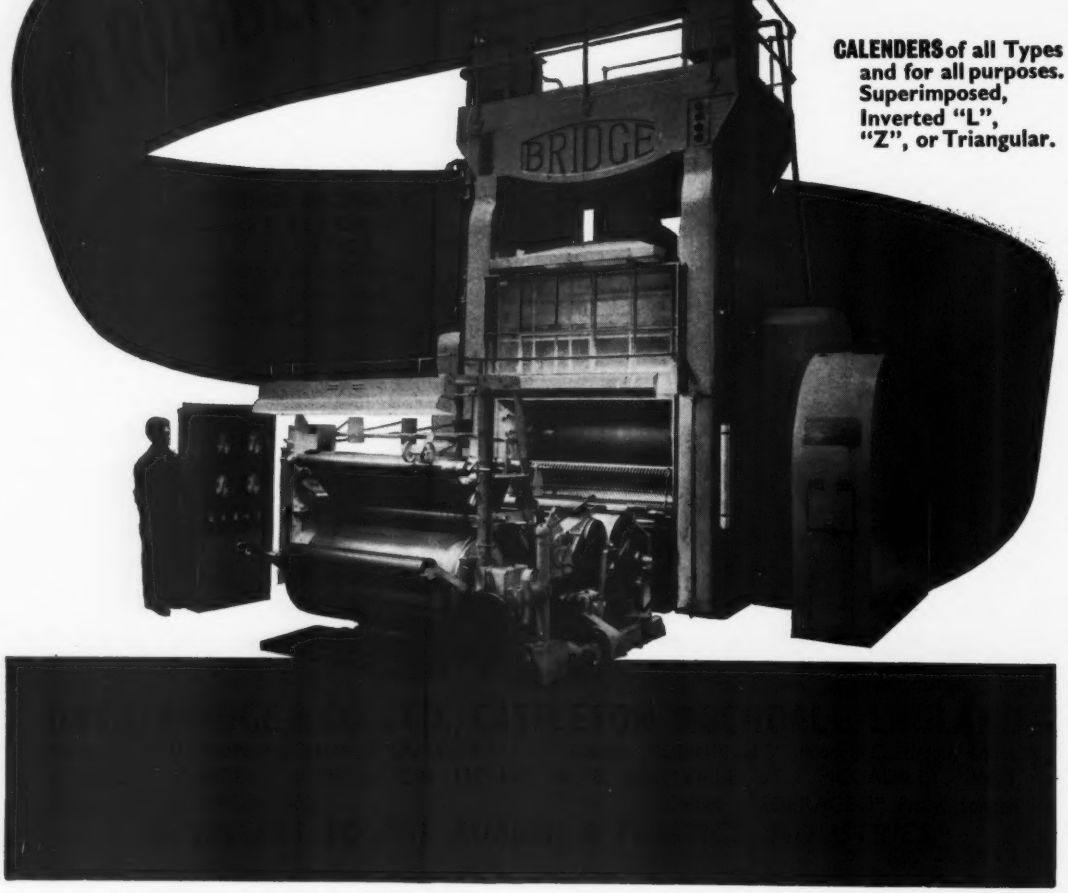
Visit us at Stand No. 76 Plastics Exhibition, Olympia June 1st to 11th

KLEESTRON LTD · West Halkin House · West Halkin Street · London · SW1 · Phone: SLOane 0866

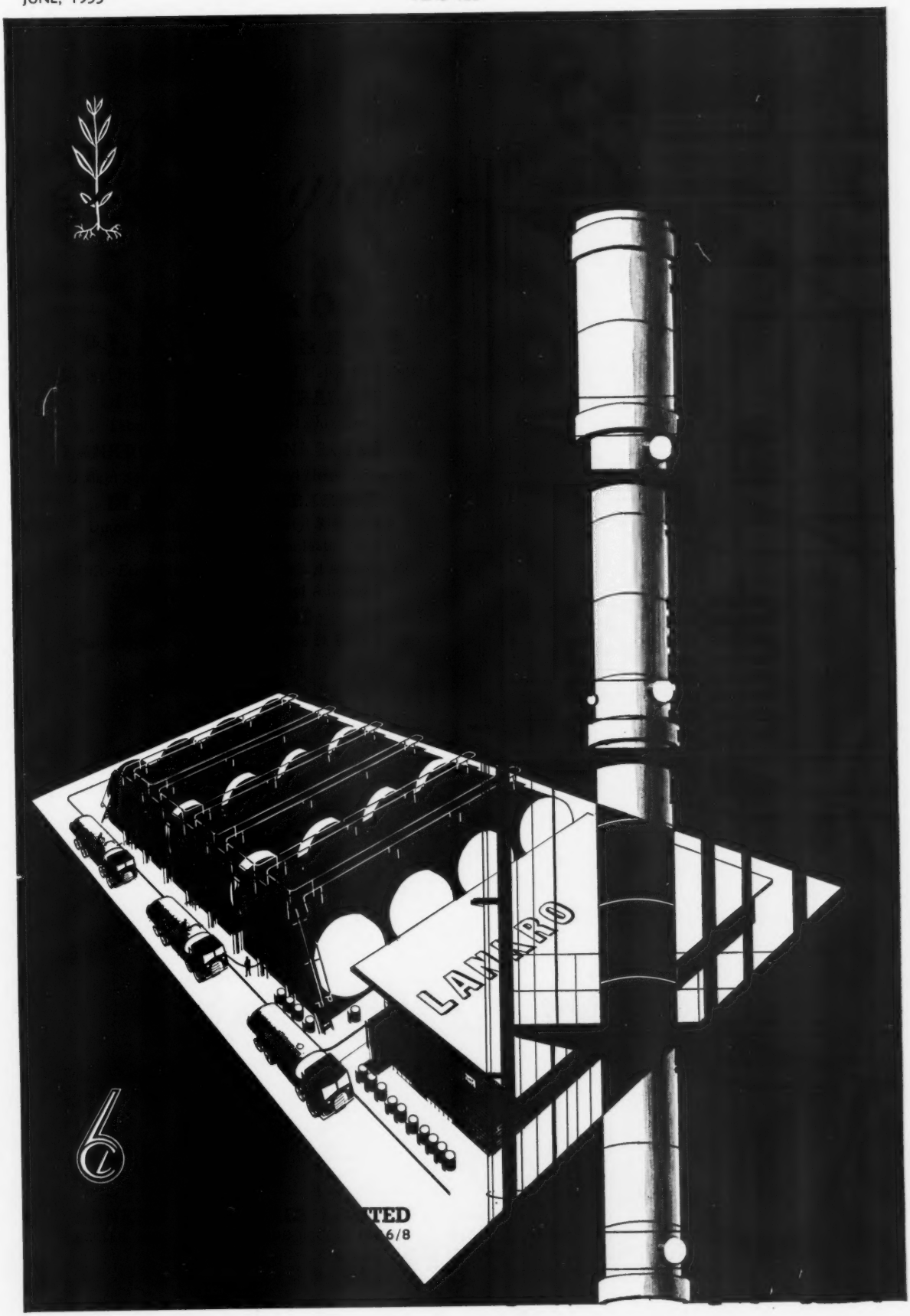


BRIDGE

dard for
efficiency compo



CALENDERS of all Types and for all purposes. Superimposed, Inverted "L", "Z", or Triangular.

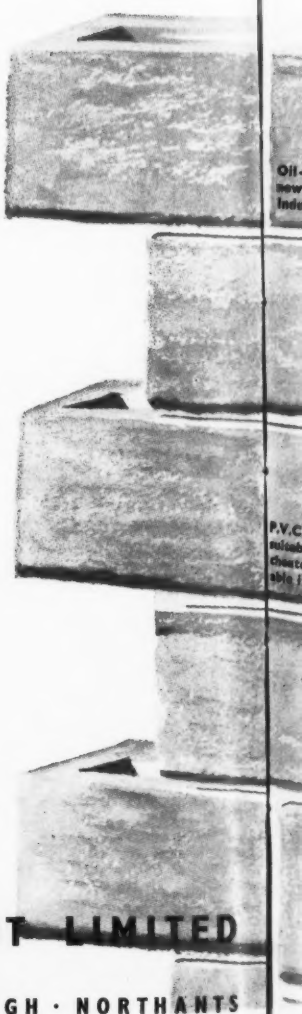

LAMCO
TED
6/8

With these bricks

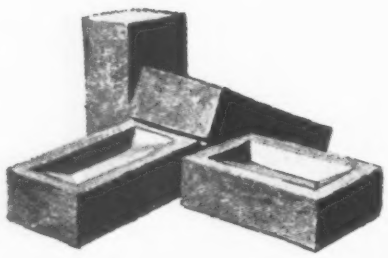
HAVE WE BUILT

WE HAVE KEYED our enterprise to the solid rocks of sound finance and commercial probity; framed it in the true steel of continual investment in the experience and creative imagination of the highest available skills; clothed it steadily with the bricks of tried and tested products.

Building thus, our enterprise has continually grown—but not too fast. And in our building we have helped many other industries and companies to grow. Our products—the bricks of our enterprise—cover many fields: mining, building, clothing, homes and gardens, sports and pastimes, engineering, and a host of others. Our range of products is already wide, and grows wider with every passing year. We should be proud to help you to grow with us.



and we are still building!



RIL

RUBBER IMPROVEMENT LIMITED

RILEX WORKS · WELLINGBOROUGH · NORTHANTS

LEONEX

'Green-for-safety' multiply P.V.C. conveyor belting. The *original* multiply non-inflammable safety belting, of which more than 200 *miles* has already been supplied to the National Coal Board.

LEC

A tough, resin-rubber so at least three times as leather. Available in cast

LEOLIN

Oil-resistant resin-rubber soling material now in wide use throughout the Footwear industry.

RILITE

Glass-reinforced Plastic Roof lighting—made in all standard corrugations and profiles—now in wide use throughout the Building industry.

RILGLAZE

A glass-reinforced plastic laminate, with good electrical insulation and fire-resistant properties. Possesses high tensile strength and impact resistance.

RILON

'Green-for-safety' multiply P.V.C. conveyor belting, processed with rayon, possessing very high tensile strength and great flexibility—the greatest advance in safety belting since 'LEONEX' 'green for safety' was introduced.

RILENE

P.V.C. sheeting plain, embossed or printed. Many pleasing shades and finishes for raincoats, curtains, fancy goods.
Also special sheetings for industrial uses including packaging.

RIL

Glass-reinforced Plastic in all standard corruga now in wide use thro industry.

RILIDE

P.V.C. Leather Cloth with fleecy fabric back, suitable for manufacture of jerkins, wind chesters and foul weather clothing. Available in a variety of colours and embossings.

RILWELT

An extruded P.V.C. Shoe Welting made in all standard sections which is resistant to attack by shoe polishes, mildew, acids and alkali.

RILCREPE

A microcellular soling material with excellent flexing resistance and adhesive qualities. Lighter than natural crepe rubber. Available in a variety of colours and surface patterns.

LEONIDE

A tough, resin-rubber soling material with at least three times the wear of natural leather. Available in castor soles and sheets.

LEOGRIP

A flerous rubber soling material designed for use in Children's Footwear—incorporates *real wool* fibres.

LEO

'Green-for-safety' multi belting. The original mable safety belting, 300 miles has already National Coal Board.

THE PROJECTILE & ENGINEERING CO. LTD.

London, S.W.8, England. Telephone: MACaulay 1212

PECO PRODUCTS

PECO

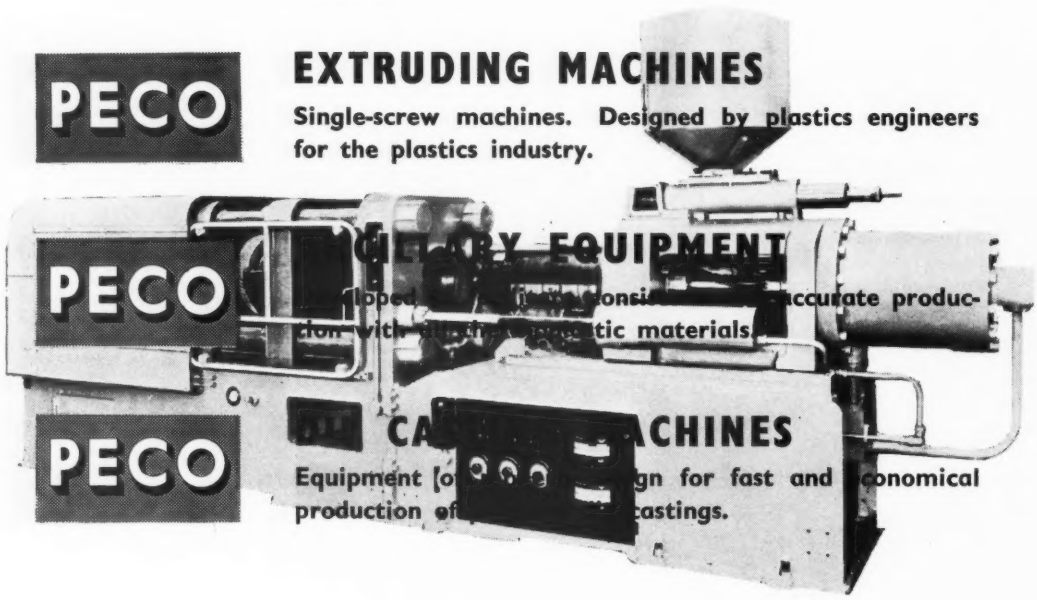
INJECTION MOULDING MACHINES

Highly productive and reliable equipment for all thermoplastic moulding requirements from 1½ to 120 oz. capacity.

PECO

EXTRUDING MACHINES

Single-screw machines. Designed by plastics engineers for the plastics industry.



PECO

...LARY EQUIPMENT

...loped ... consis... accurate produc-tion with ... tic materials.

PECO

CA... ...ACHINES

Equipment [o... ...gn for fast and ...onomical production of ... ...castings.

You are invited to write for illustrated literature on all PECO Products

Please address your enquiries to:

PECO MACHINERY SALES (Westminster) LTD.

28 Victoria Street, London, S.W.I. Telephone: ABBey 1793/5

1000·028 ± 0·002 cm³
and SYNTHITE FORMALDEHYDE!

I don't quite see the connection!

Just this! Some things are naturally constant—this formula for instance. It represents the volume of 1 kg. of pure water at 40C. Whatever changes take place, this, at least remains the same. So, too, Synthite resin research workers have come to rely on the unchanging uniformity of Synthite Formaldehyde. Furthermore, a manufacturer can always rely on prompt delivery of his formaldehyde supplies. A telephone call is sufficient to bring a fast tanker speeding towards your plant—no matter what part of the country it may be. This instant delivery service is typical of the skill and efficiency which first produced Synthite Formaldehyde 35 years ago.

SYNTHITE FORMALDEHYDE

☆ *40% by volume*
☆ *Water—white*
☆ *Free from deleterious matter*
☆ *Consistent in quality*

Manufactured by
Synthite Limited, West
Bromwich, Staffs

A member of
the Tennant Group
of Companies

SELLING AGENTS: BARTER TRADING CORPORATION, 14 WATERLOO PLACE, LONDON, S.W.1

MANIPLASTICS offer a full service fr

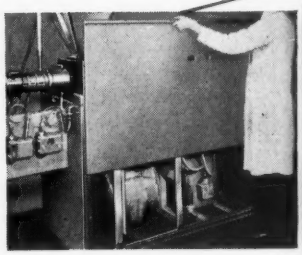
THE Manistruder Mk II has been designed by specialists in plastics extrusion, with an essentially practical approach to the problems of this field. It has been designed with the following objectives in mind:

- **To provide a machine of low initial cost.**
- **To ensure the maximum degree of simplicity, versatility and flexibility.**
- **To provide a high output rate.**
- **To ensure ease of maintenance and replacement of component parts.**

The Manistruder Mk II is available in 2-in., 3½-in., 4½-in., and 6-in. types. Subject to sizes, etc., of sections being produced, the 2-in. type, for example, will give an output of up to 100/120 lb. of material per hour.

DEMONSTRATIONS

Apart from the special facilities to see the Manistruder in action at the British Plastics Exhibition, a demonstration machine is always available at our premises. We shall be delighted to welcome you and to demonstrate either on materials we have on call, or on your own materials if prior notice is given.



to complicated HAUL-OFF EQUIPMENT . . .

MPL Variable speed 10 ft. belt type Haul-off equipment with accurate height adjustment.

First . . .

In the field with really practical and economical plastics and rubber extruders, you'll find MPL worth getting to know. We're always ready to undertake the design of special equipment to your own particular requirements, or to carry out research for you with special materials, or on difficult production problems. Come and have a chat with our Executives at the Exhibition—as you might expect we're on

STAND No. 1

Demonstrations of the Manistruder and Ancillary equipment will be given daily.

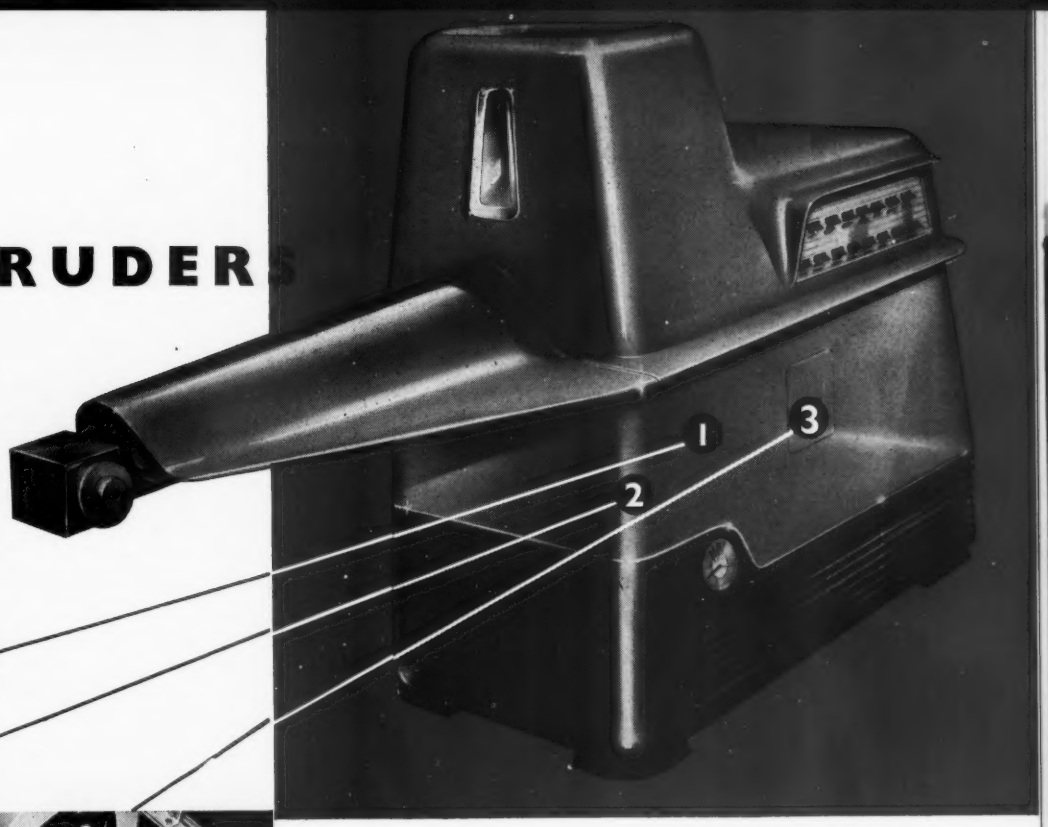
MANIPLASTICS LTD • HARE STREET • LONDON • S.E.18 • •

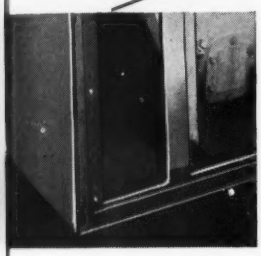
ce from EXTRUDER

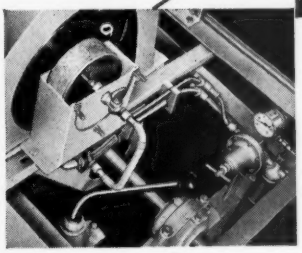
1 In addition to the streamlined version of the Manistruder illustrated right, we can supply a special design incorporating removable panels, making maintenance tasks even easier.

2 The frame of the Manistruder is of welded steel angle construction, resulting in tremendous advantages in cost and weight and immunity from the danger of fractures inherent in a casting.

3 The Manistruder Mk II 2-in. type is powered by a Brookes 10 h.p. motor (a two-speed motor is also available). The principle of using reliable and easily obtainable drive components applies to all Manistruder types.

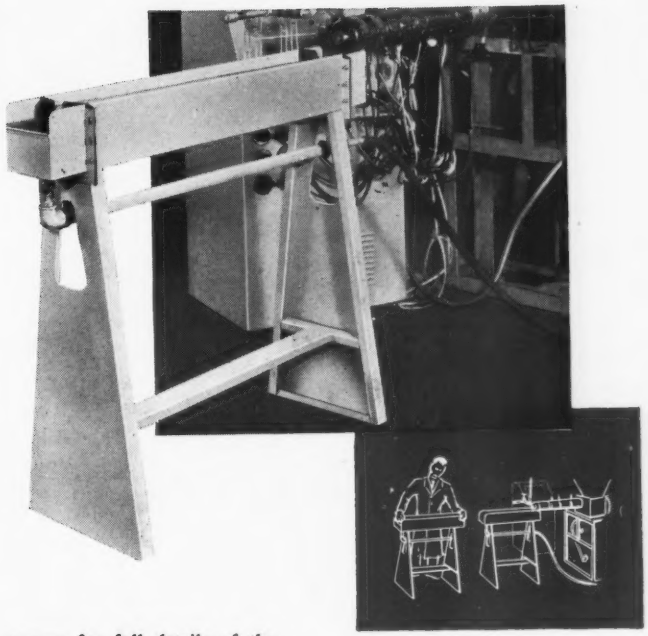






• • • • and other Ancillaries

MPL Ancillary Equipment, although originally designed for use with the MANISTRUDER Mk II, is equally suitable for use with any extruder. It will be shown in action together with the Manistruders on STAND NO. 1, BRITISH PLASTICS EXHIBITION. Don't miss this opportunity.



HAUL-OFF EQUIPMENT

Two types available:

1. Variable speed, for hauling-off small bore cable and tube, clothes line, etc. Can be used for hanking, coiling, etc.
2. Variable speed, 10 ft. belt types for hauling-off large bore tubing or other sections. Provision is made on the unit for accurate vertical adjustment. Speeds of from 3 ft. per minute to 150 ft. per minute can be obtained. (See illustration left.)

UNIT CONSTRUCTION WATER BATHS

Rigidly constructed of heavy gauge galvanized material. They are of novel form in that unit construction is used, thus making possible a rapid extension of the bath's effective length by the addition of further units. (See illustration right.)

• • • Phone WOOlwich 0885

Post the coupon for full details of the Manistruder Mk II, Ancillary equipment, and particulars of demonstration facilities.

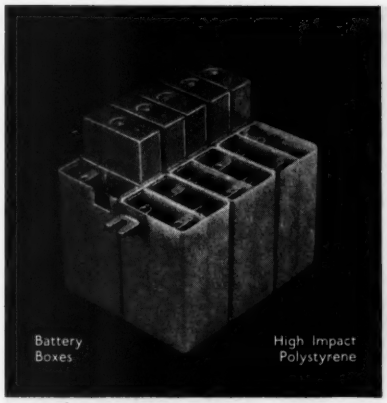
To MANIPLASTICS LTD., HARE ST., LONDON, S.E.18
(Phone: WOOlwich 0885)

Full details please

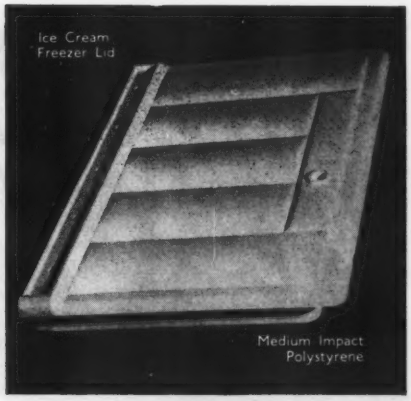
Name_____

Address_____

P/6/55_____


Battery Boxes — High Impact Polystyrene

Battery Box — Glass Fibre Reinforced Plastic


Ice Cream Freezer Lid — Medium Impact Polystyrene

Television Selector Knob — Polystyrene

U·M·P

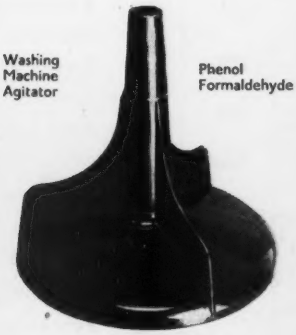
For Tubes and Plastics

STAND No. 28

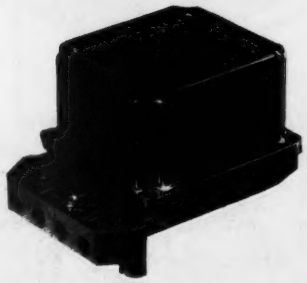
BRITISH PLASTICS EXHIBITION

Vacuum Jug — Paper filled and wood filled urea formaldehyde

Gear in Nylon — Refrigeration Tray in Polythene


Washing Machine Agitator — Phenol Formaldehyde

Air Purifier in Cellulose Acetate — Food mixer in wood filled urea


Meter Case in Phenol Formaldehyde

For expert advice and service in Plastics Problems

Discriminating Buyers prefer

Kidney bowl in Melamine

Domes in Diakon

UNIVERSAL METAL PRODUCTS LTD.

SALFORD 6 LANCS. *Telephone:* PENDLETON 4444

LONDON OFFICE: ARGYLE HOUSE, 29/31. EUSTON ROAD. N.W.1. TEL. TERMINUS 2073

All New HPM

THE WORLD'S *MOST COMPLETE LINE* OF PLASTICS INJECTION MACHINES!

STANDARD INJECTION MACHINES

MODEL NUMBER	150-H-6	300-H-12	400-H-20	800-H-48
Capacity (oz.–Single Feed)	6	12	20	48
Capacity (oz.–Double Feed)	8	16	28	64
Material Injected (cu. in. per min.)	440	1035	1330	2895
Plasticizing Capacity (lbs. per hour)	60	100	135	350
Mould Clamp Capacity (tons)	150	300	400	800
Mould Space (hor. × vert.):				
(a) Full Platen Vert.	10½″ × 25″	16½″ × 33″	20½″ × 42″	36″ × 54″
(b) Full Platen Hor.	20½″ × 15″	30″ × 20″	36″ × 26½″	54″ × 36″
Daylight Opening without Ram Spacer	20″	30″	40″	55″
Daylight Opening with Ram Spacer	16″	26″	34″	47″
Mould Thickness without Ram Spacer	10″	10″	15″	20″
Mould Thickness with Ram Spacer	6″	6″	9″	12″
Clamp Travel (max.)	10″	20″	25″	35″
Motor Horse-power	20	40	50	100
Shipping Weight (pounds)	14500	22000	39000	75000

NOTE: All ratings based on moulding general purpose polystyrene

Other H.P.M. Models are available with these capacities:—

STANDARD
Model 600-H-32 Capacity 32 ounces.
,, 1200-H-80 ,, 80/100 ,,

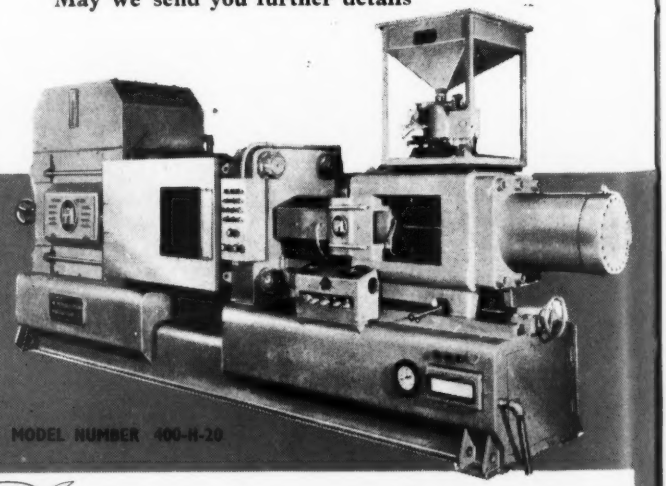
PRE-PLASTICIZING
Model 400-P48A Capacity 48 ounces.
,, 1200-P200 ,, 200 ,,
,, 3000-P400A ,, 400 ,,

From 6 ounces to 400 ounces; with mould clamping pressures from 150 tons to 3,000 tons . . . that's the scope of the new H.P.M. range.

Each machine is new, designed with many outstanding features. High capacity plasticizing chambers, weigh feeders, greater 'shot' capacities, increased daylight and stroke, quiet pumps, and sub-plate mounted valves reducing piping to the absolute minimum, are some of the reasons why H.P.M.'s mould better, faster and at lower cost.

They are famous for dependability too; designed by America's pioneer manufacturers of injection machines, each unit has 77 years' hydraulic machinery building experience behind it.

May we send you further details



MODEL NUMBER 400-H-20

WICKMAN LIMITED

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designers now have filabond polyester resins

NEW constructional materials for the production of commercial vehicle bodies

more facts on the subject

FILABOND 8011 is a light-stabilised polyester resin. It is recommended for the fabrication of **TRANSLUCENT** domes of all types of Door-to-Door Delivery Vans in glass fibre reinforced polyester laminates by the cold lay-up method.

greater impact strength

FILABOND 8001 is in increasing demand for the fabrication of **PASSENGER TRANSPORT VEHICLES** in reinforced polyester laminates by the cold lay-up method. Parts eminently adaptable are: domes, corner panels, wing valences, wheel boxes, destination boxes and ticket boxes. Write for special brochure describing the production of vehicle bodies in Filabond polyester resin and glass fibres.

FEATURES..
Low initial cost . . . Low maintenance . . . High impact strength . . . High strength/weight ratio . . . Solid moulded colours in smooth finishes . . . Economical fabrication of double curvatures.

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ASSOCIATE WORKS: REICHHOLD CHEMICALS INC., DETROIT, U.S.A.

Samples and details available from the Sole Selling Agents,
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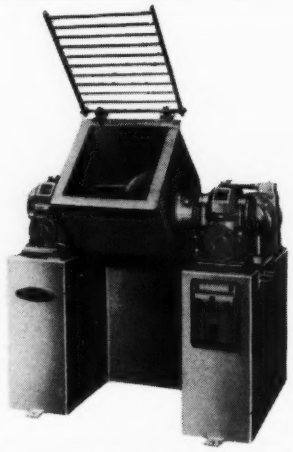
In a fix about a **mix?**

talk to **GARDNERS** of Gloucester

IF you've a mixing problem on your mind, why not talk to Gardners of Gloucester ? Whether it's a wet mix or a dry one, fine or coarse, whether you want to dry the materials as you mix or add flavouring or perfume at the same time, Gardners can supply the right machine. The wide range of standard machines has uses in industries ranging from food to fertilisers. And Gardners are always ready to design or modify any machine to suit your own special needs. Send along a sample for free test and confidential report.



The Gardner Double Arm Mixer

Specially suitable for mixing pastes and mixtures of a dough consistency and for handling thick creams which cannot be mixed in the ordinary Gardner Patent 'Rapid' Mixer. Mixing trough is arranged to be tipped for emptying. This is just one of the wide range of Gardner Mixers.

Send for the Gardner List giving details of 22 types of the very large range of sifting, mixing, drying and grinding machines.

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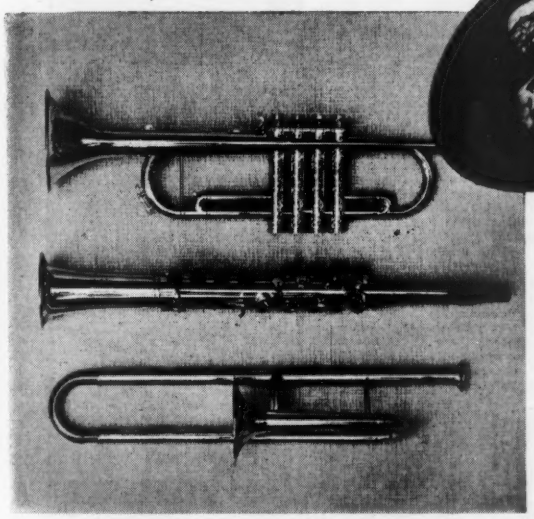
JUNE, 1955

LUSTREX* hits a high note

These superb, intricate toy instruments are moulded in Lustrex Hi-Flow 55 and Lustrex Toughened 1. Lustrex Heat Resistant Grade is used for the reeds.



This selection from the "Golden Tone" range is marketed by Selcol Products Limited. Moulded by Thames Valley Moulders Limited.

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MONSANTO PLASTICS LIMITED

186 Victoria Station House, Victoria Street, London, S.W.1

and at Royal Exchange, Manchester, 2.

In association with: Monsanto Chemical Company, St. Louis, U.S.A. Monsanto Canada Ltd., Montreal. Monsanto Chemicals (Australia) Ltd. Melbourne. Monsanto Chemicals of India Ltd., Bombay. Representatives in the world's principal cities.

THE ENGINEER'S PLASTIC

FrōmoPLAS H.T.

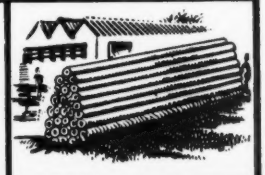
WITHSTOOD AN EXPLOSIVE BLAST WHEN OTHER PLASTICS DISINTEGRATED

and this is why

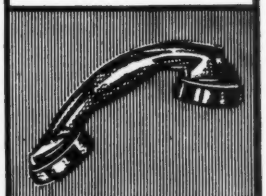
Specific Gravity	1.24
Tensile Strength, p.s.i. B.S. 771/48..	9-10,000
Impact Strength Izod. B.S. 488/48 Pressed Sheet	14-16 ft. lbs. ½" sq. notched bar
Extrusion -	9-11
Moulded -	7-9
Elongation at Break	15%-20%
Effect of Heat	Rigidity unchanged up to 90°-100° C
Effect of Petrol, Paraffin and other Hydrocarbon Oils	Negligible

FrōmoPLAS H.T. is a completely new thermoplastic copolymer resin. Most of its physical characteristics far exceed those of other thermoplastic materials. For strength, toughness, and durability, coupled with lightness it is unrivalled. FrōmoPLAS H.T. is the new material for engineers.

Pipes made from FrōmoPLAS H.T. are lighter and stronger than those made from the usual thermoplastic materials. Their anti-corrosion properties make them ideal for carrying water, petrol, paraffin, and many other liquids.



Mouldings in FrōmoPLAS H.T. have withstood tests far in excess of the generally accepted standards. In fact FrōmoPLAS H.T. approaches commercial aluminium in tensile, sheer, and impact strength, and therefore has a very wide range of applications in which other types of rigid plastic fail.



In its sheet form the tough but light FrōmoPLAS H.T. is being used in the Vickers 'Viscount'; an excellent recommendation for this outstanding material. FrōmoPLAS H.T. in sheet form is also being used for numerous special purposes by the Admiralty and Ministry of Supply.

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(Incorporating Frome Plastics Ltd.)

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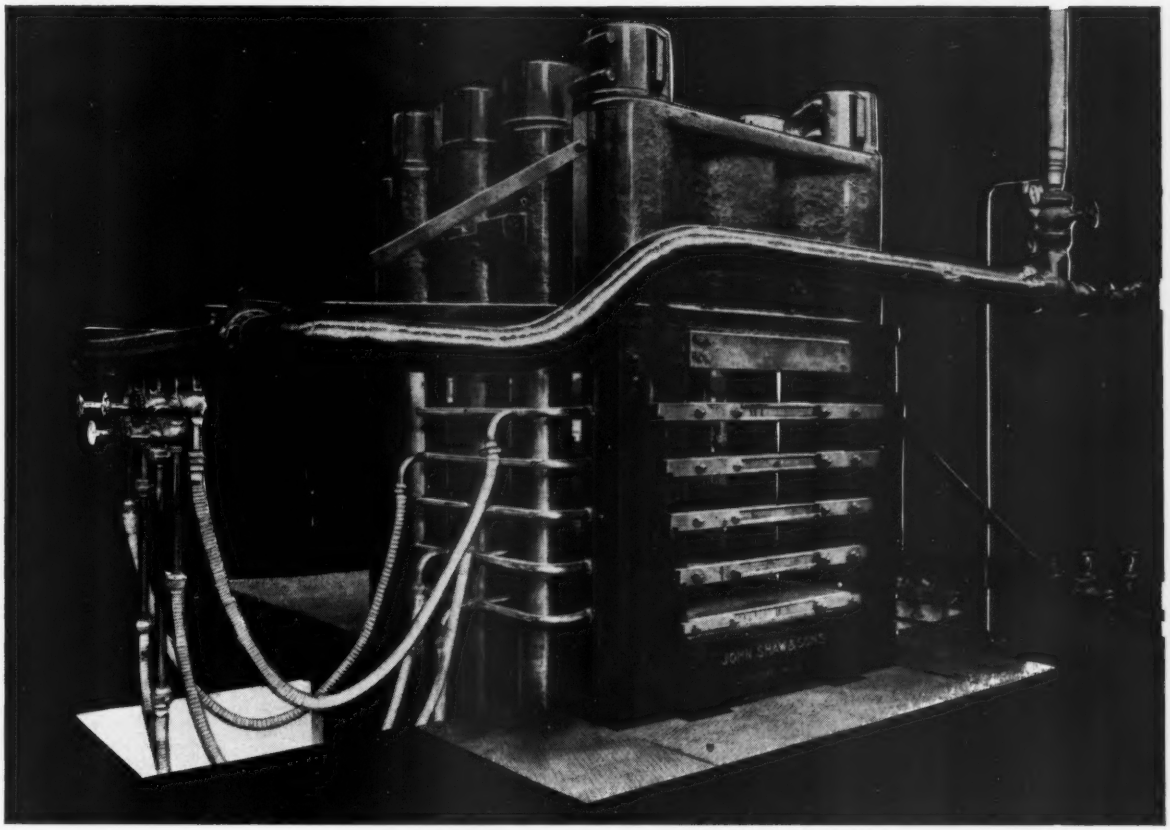

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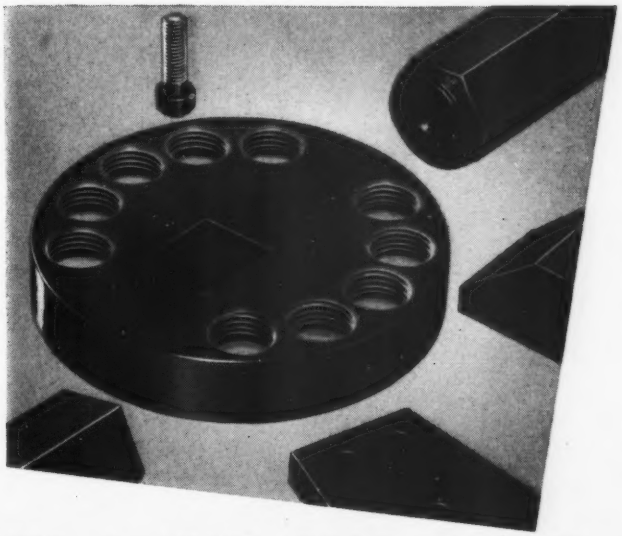

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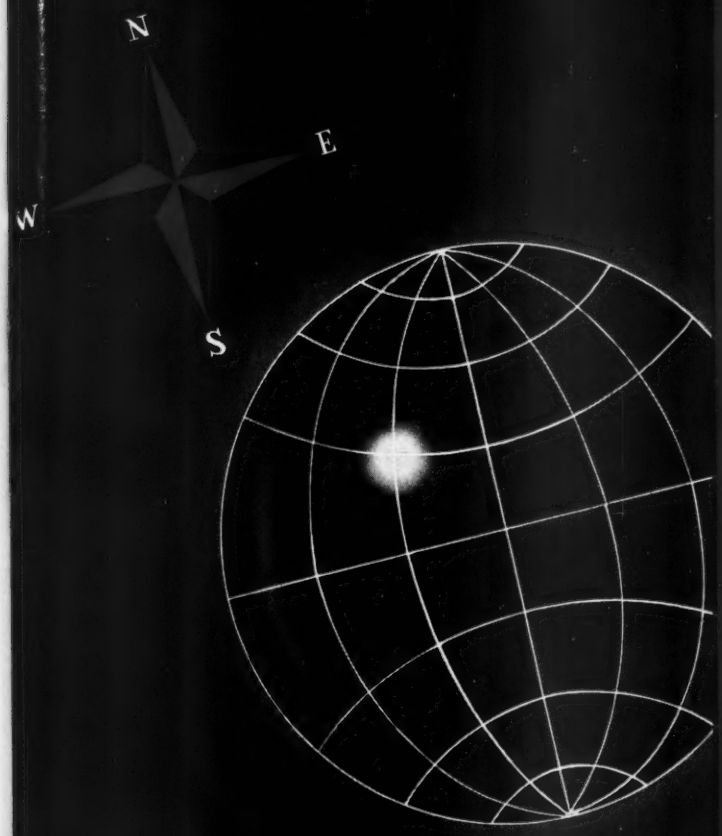

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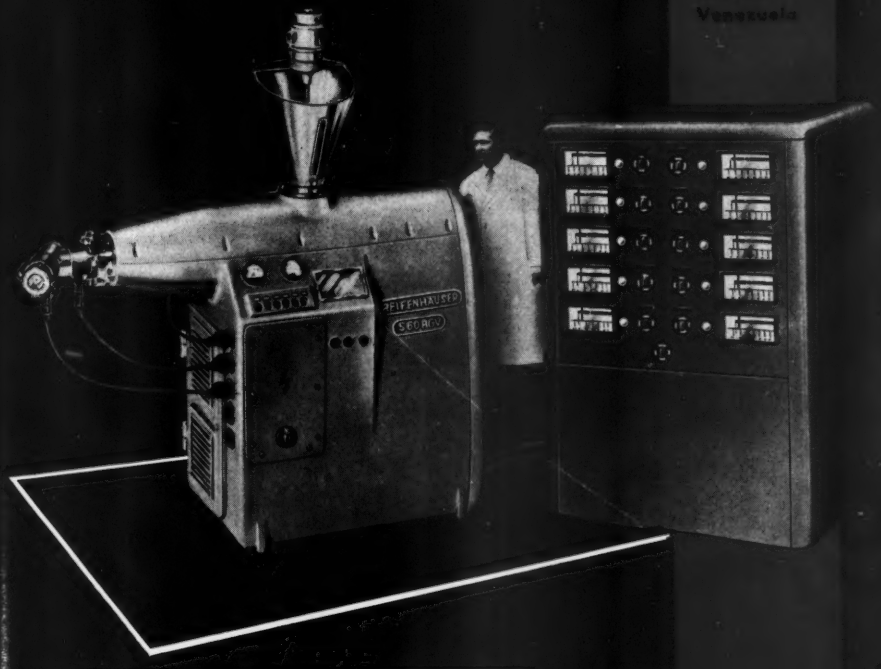

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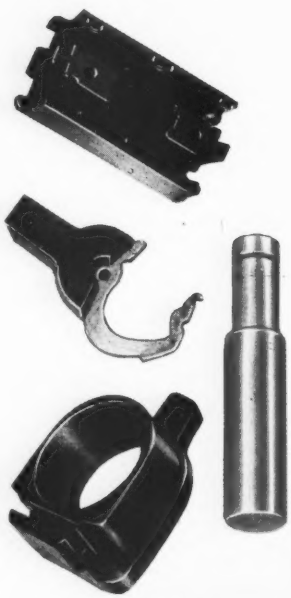

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The Pressed Steel Company Limited were looking fo
an attractive, functional easy-to-clean evaporator do
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It was our kind of job..... technicians and workmen
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Simple, streamlined, effective—altogether a pretty
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and we at Rootes Plastics like to think so too.
No matter how big or small, if your problem is plastics bring it to the Rootes door—you won't even have to knock.

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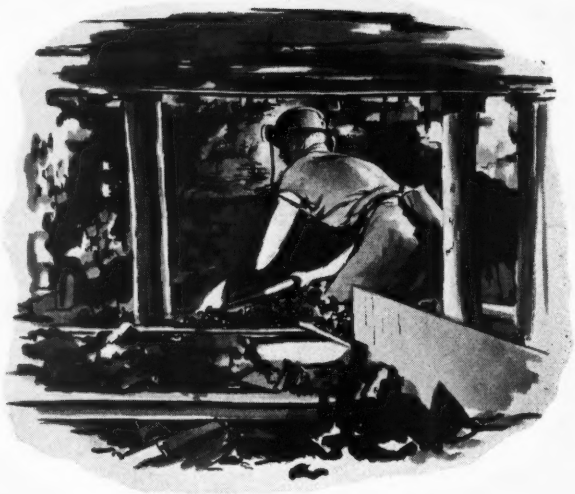
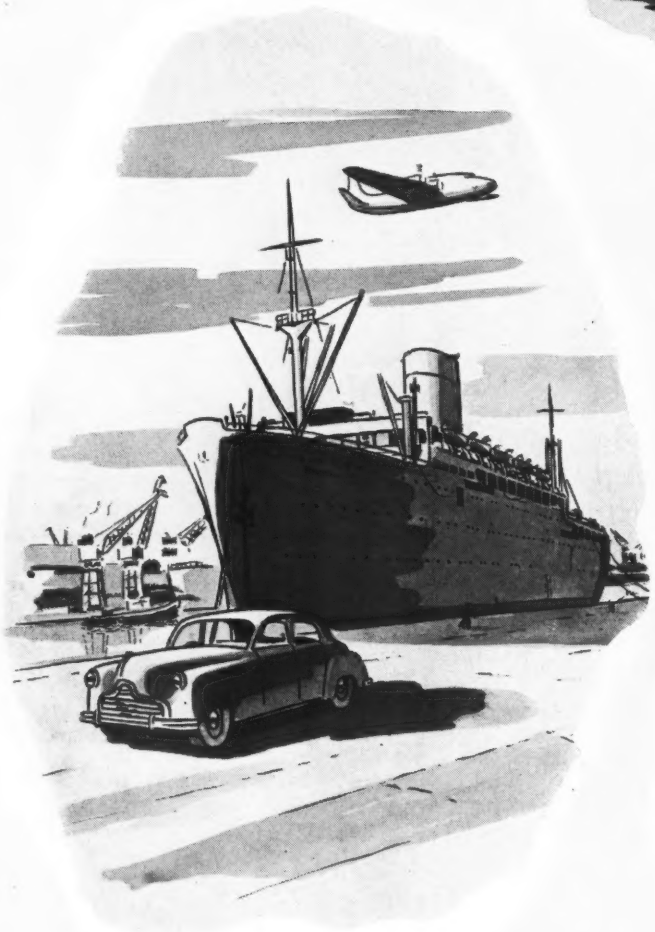
This miner's job is safer because the risk of fire is reduced when the conveyer belt he loads is made with Geon PVC.



THE AGE O



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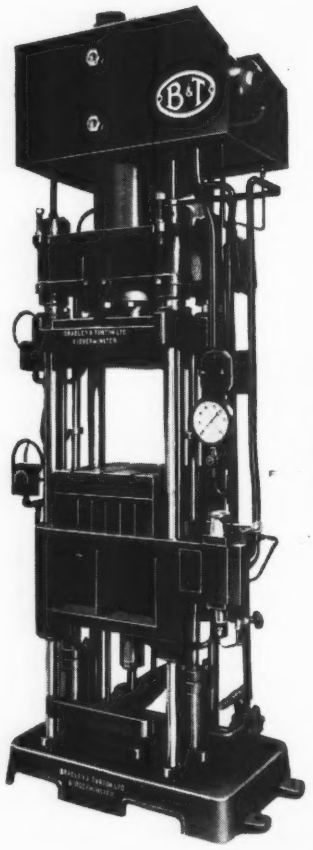

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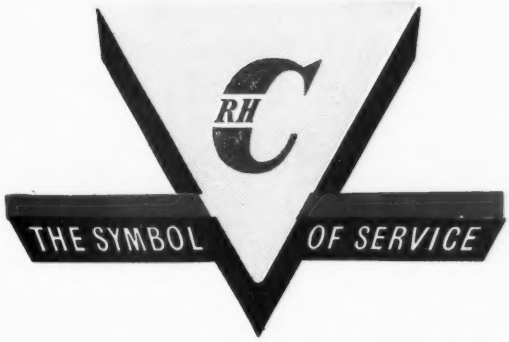

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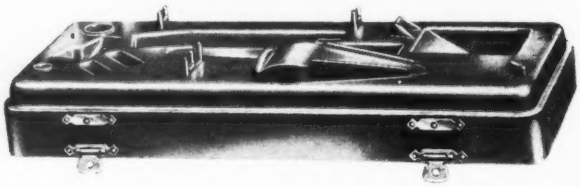

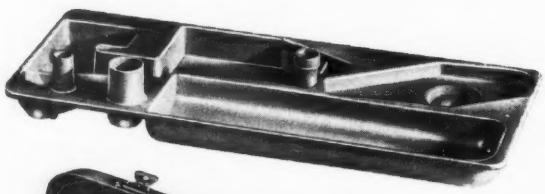

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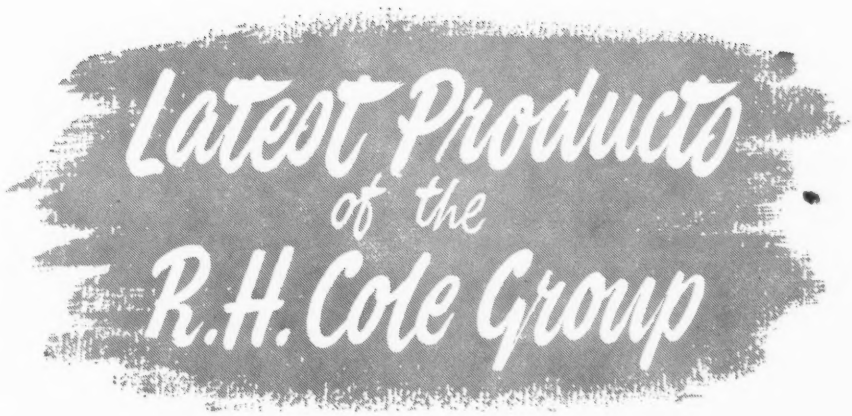

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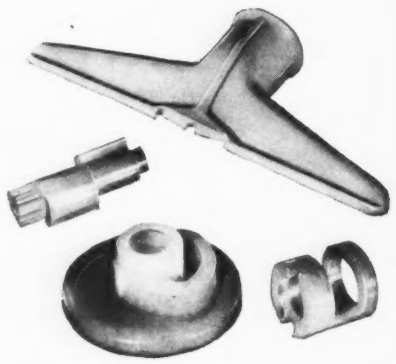
DURETHAN BK



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- Low specific gravity
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This combination of properties makes DURETHAN BK particularly suitable for a wide range of technical applications. The undermentioned are but a few of the large number of technical items satisfactorily manufactured from DURETHAN BK:

Rollers
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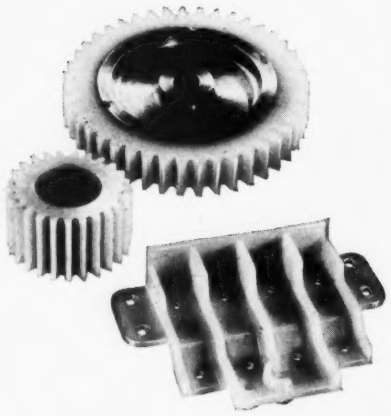
Shaft pinions
Cams
Handles
Nuts for geared spindles
Slides and slide shoes
Small machine housings
Closures

DURETHAN BK is used in general machine building, measuring and scientific instrument manufacture, in domestic appliances, vehicles, sports goods, toys, and in a host of other articles in daily use.



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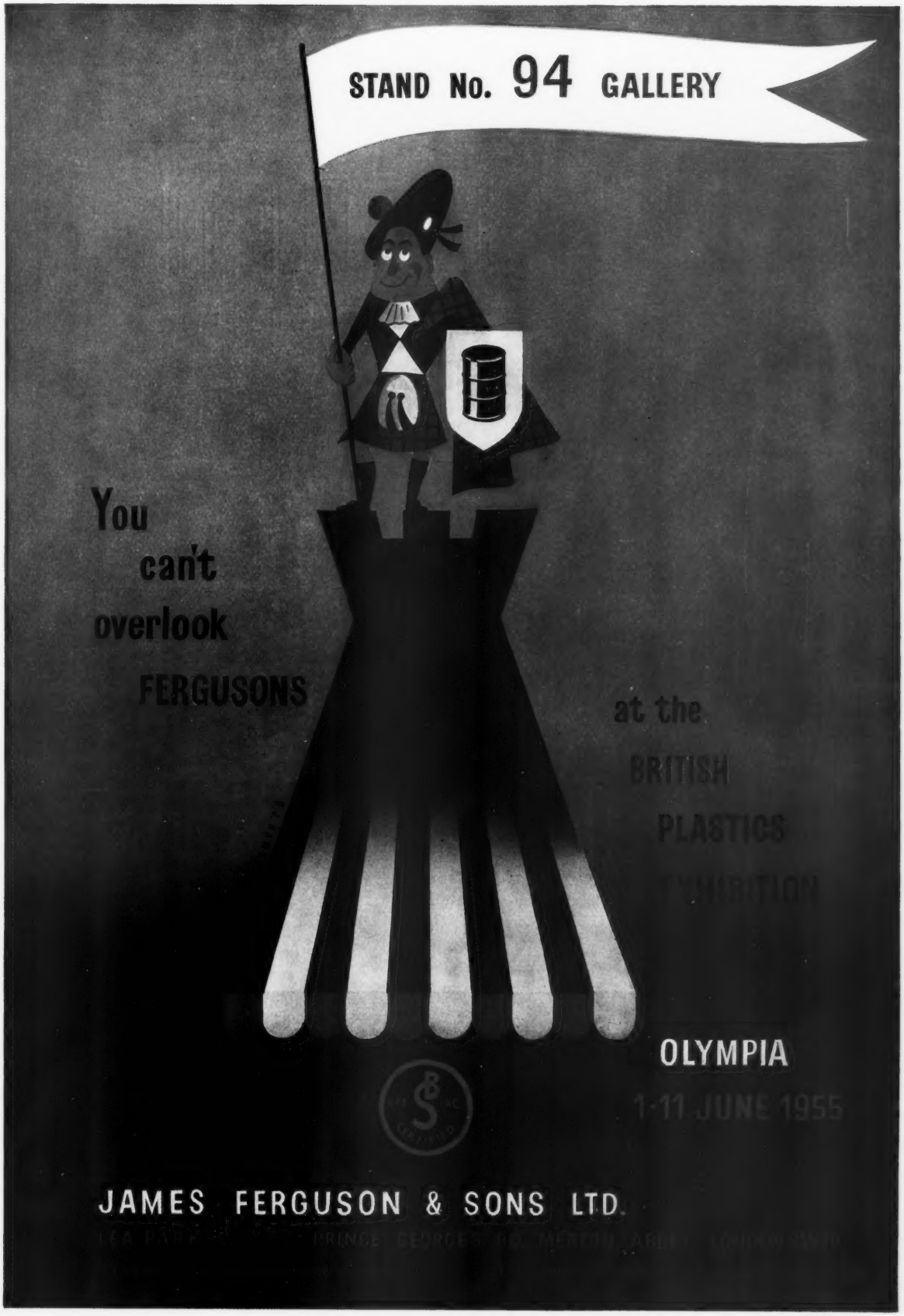
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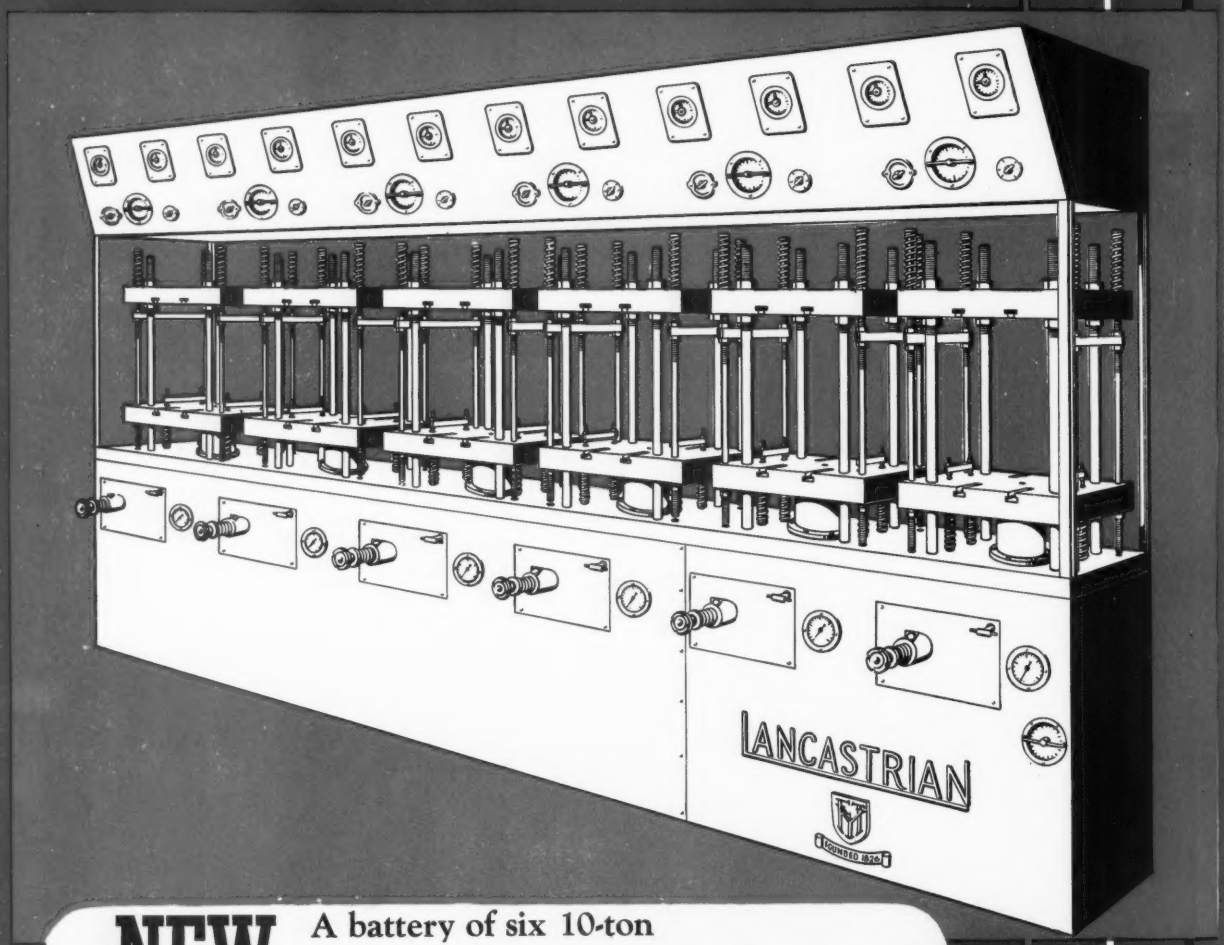

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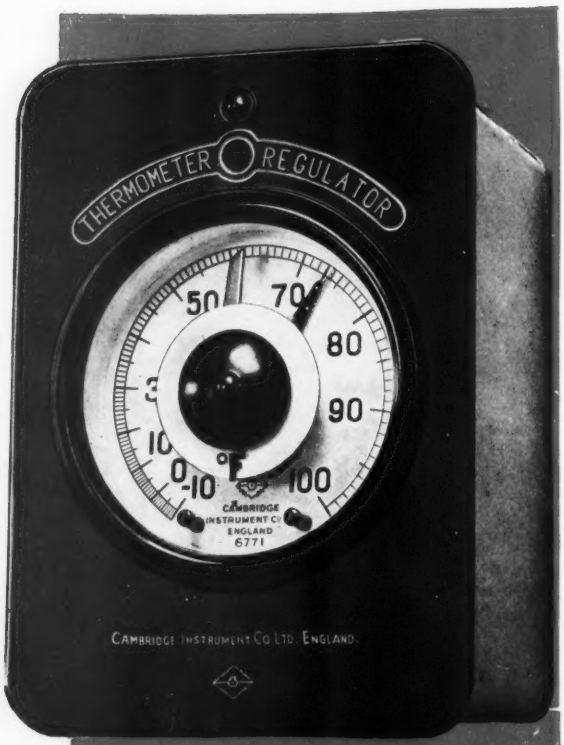

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Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

PROPRIETORS: TEMPLE PRESS LIMITED

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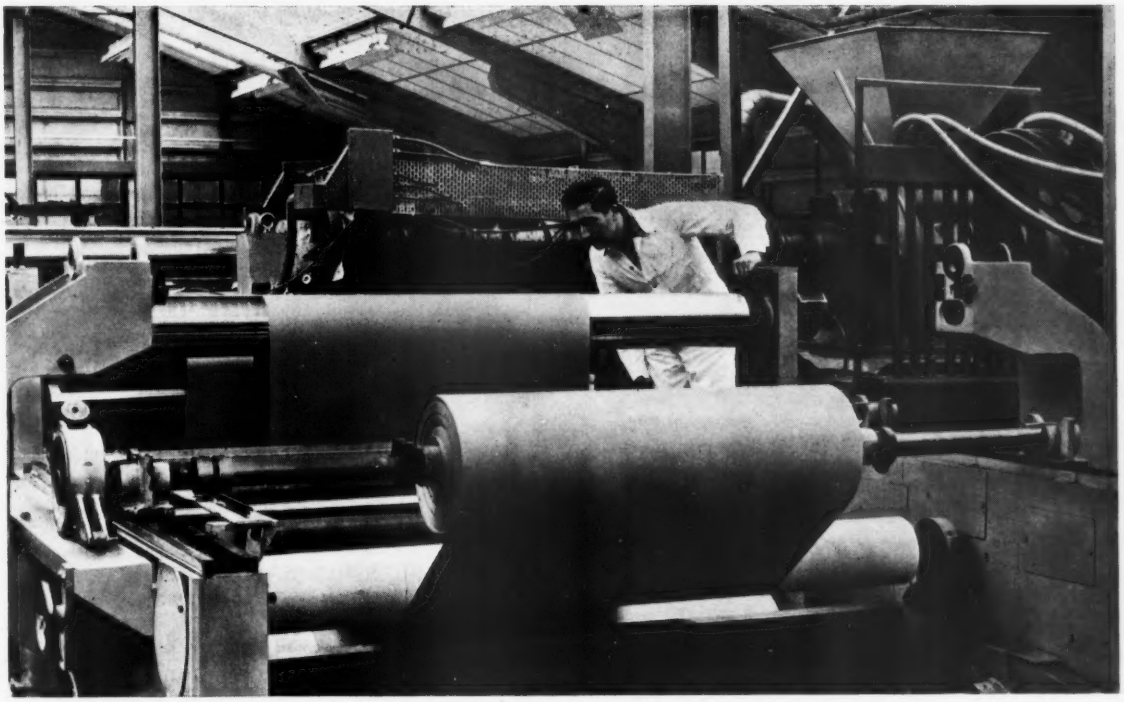

New polythene/paper laminating machine at the Farnborough works, Kent, of the Telegraph Construction and Maintenance Co. Ltd.

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OLYMPIA, JUNE 1-11
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Plastics

VOL. XX. No. 215 JUNE, 1955

EDITORIALS

Plastics Exhibition

THE third British Plastics Exhibition at Olympia is by now established as the plastics industry's own show in all its facets and is more than ever clearly defined in spite of its greater apparent complexities and widening conformation.

What has happened to the industry during the intervening two years since the second exhibition is astonishing in production capacity, for the new types of plastics that have appeared and their widening applications and for the expansion in machine manufacture for their manipulation. It is highly improbable that any traditional industry can compare with the plastics industry in swiftness of growth, quantitive or qualitative. A short review of the technical advance during this short period is given on pages 167 to 170. One fact of exceptional importance that might be added to it, is the growing interest and indeed the growing participation by " outside " companies hitherto completely divorced from plastics. We refer to the interest of many purely engineering companies now that the physical properties of our improved materials are better known and high strength compositions have shown some of their medals.

The general form of the exhibition has been improved, since attention is immediately drawn to the applications of plastics by confining the ground floor to moulders, fabricators and plant and equipment manufacturers while the first floor is almost completely devoted to stands of raw material producers. We believe it important to give visitors, that is potential buyers of mouldings and fabrications a glimpse first of the finished goods of the industry. There are 66 of these and 22 raw material producers.

What will our visitors see? First, we should like to tell them of the greatly increased production in recent years about which they can read in the article entitled " The Next Ten Years " and which contains the story of the change of the face of the chemical industry by the introduction of a petrochemical industry which has been designed to cost £50,000,000 in the next year or two and more after that. Thus we are creating a chemical industry complementary to that of the coal tar industry making the whole flexible enough to deal with changing times and events.

We are rapidly increasing p.v.c., polythene and polystyrene production and the proposed figures for 1956 and 1957 will, if we are permitted to extrapolate the upward curve, be insufficient for the demand in those years. Nylon manufacture is increasing and the number of types is widening. Polytetrafluoroethylene is now being produced and so are a number of high-impact polystyrenes. In regard to the latter, we could wish that those manufacturers who make them by mechanical mixture with synthetic rubber would not refer to them as copolymers. These mixtures are very good and serve their purpose but they are not copolymers. To call them " alloys " as some do is a bit of an improvement, but sounds metallurgical. " Rubber-modified " is clear and more accurate.

What finished goods shall we see? A simpler question would be what shall we not see for there will be something for almost everybody—in every plastic and in many new applications and designs. There will be mouldings in the new alkyds and in copolymers and in p.t.f.e., some examples of the use of polyurethanes and very strong sections of new fabrications in glass-fibre polyester and epoxy resins to show the road along which we are moving to high strength engineering structures.

Finally, there are the machines of the industry, the compression, injection and extrusion types and their latest modifications, the new vacuum forming plants, high frequency heating machines and welding plant, of which some 1,200 were made in 1954 and accounted for £770,000 in exports alone.

Synthetic Rubbers

THE news given in a previous issue concerning the production by I.C.I., Ltd., Monsanto Chemicals, Ltd., and Dunlop Rubber Co., Ltd., of synthetic rubber is one of the most heartening pieces of news we have had for a long time. At very long last, after a propaganda that began after the first world war by a few individuals and some of the chemical journals, we are treading the right road.

The extent of the whole scheme can be gauged in part by the large plant for butadiene production laid down by I.C.I., Ltd. As a close estimate, about 10,000 tons a year of butadiene copolymers should be produced by this company alone, and since the oil-resistant synthetic rubbers are in such demand we presume that about 50% of the total production will be in the form of butadiene acrylonitrile. We should expect to see samples available for evaluation by potential users early in 1956.

Mariage de Convenance?

MORE than two years ago this journal made the suggestion that a marriage between the rubber and the plastics industry, so far as a unified educational system is concerned, would be a logical and a useful one. Scarcely a love match, for the older rubber industry in this country, although highly scientific and technical and productive of many machines and methods that the plastics industry has copied, has never until recent years taken the slightest interest in our work or productions, or in any type of synthesis, other than academically. But love may come!

The world should be grateful for its work, for its pioneers well over 100 years ago created one of our greatest and most useful industries. It organized vast plantations and forests, shipped the rubber to England, the greatest centre of the world for its sale, processing it into the hundred and one commodities it developed. But it had no interest in plastics and none in the chemical industry. Its organized highly qualified staffs understood all about the theory of production of synthetic rubbers but none of its practice, for the rubber industry refused to recognize the necessity.

Our suggestion, therefore, was received by the rubber industry with no great warmth. Nor did the temperature of the emotions of the plastics industry rise.

Yet the rubber industry was then beginning to use polyvinyl chloride and certain other polymers made by the plastics

industry and today is compounding them. It is using synthetic rubbers (when it is permitted by the Government) bought at great cost from the United States because of the important demand. And the welcome change of heart, the production of synthetic rubbers, is at last about to take place, for the biggest rubber company of all is about to manufacture on a large scale. And as we have announced before, the largest chemical and plastics-producing company is also about to synthesize them from petroleum. There has been no marriage yet, but there is evidence of " petting " operations, and perhaps even of an exchange of engagement rings—without official approval of parents. So far as the plastics industry is concerned, it has been modifying its phenolic moulding powders and its polystyrene for the past few years to give them special properties, and all this permitted Dr. Schidrowitz, the famous rubber technologist, to announce a year ago that " While the rubber and plastics industries are not yet married, they are definitely walking out together."

There has been some talk in our industry of the desirability of forming a National College of Plastics Technology. But there is an excellent and fast-growing National College of Rubber Technology with a strong plastics side about which we wrote in January, 1953: " Can we not see in it the germ of a future National College of High Polymer Technology? " To us it seems utter folly, financial and educational, to think of two separate organisms in the same field.

We know many agree with our suggestion and that the Ministry of Education is prepared to help financially.

MOULDING POWDER AND SHOT

Lilies of the Field

One of the things that struck me most at last year's Paris, Frankfurt and Milan plastics exhibitions is that the representatives on stands at these overseas shows (there's a move on to avoid the word " foreign "; don't ask me why) are under the strange impression that they're there to sell the goods shown or at least " to put across " their company to potential customers. Of course I wouldn't go so far as to suggest there might be something in it. I prefer that ineffable aloofness adopted by some of our own stand-loungers, especially the young, who with green carnations in their lapels and supporting their exhausted selves against the nearest pillar, exude the impression that they are at least sales directors or still more important, chief chemists, and the inference that while you, the customer, may permit yourself the honour of treading the parquet floor and of looking around, you must understand that they're not really there to answer your inevitably foolish questions. And if there's nobody there, please to understand that the said representatives have only just gone into their little cubby-hole (or somebody else's little cubby-hole) to gather more strength to live on until closing time.

◆ ◆ ◆

The Shape of Things

Went to see the new Bakelite film, " To Shape Tomorrow," and a very fine, carefully conceived and smoothly flowing one in ideas it is—all in very excellent colour too. It conveys to the average householder, so acceptant without thought of the modern amenities of life, something of the incidence of plastics in his home surroundings, of the whys and wherefores of their use and the methods of their manufacture. The camera thus travels from the kitchen and the other rooms in the house, right into the Birmingham and Aycliffe factories of the company and back again. An ingenious and instructive film for all—the public and the student, young and not so young.

◆ ◆ ◆

Catalin Branches Out

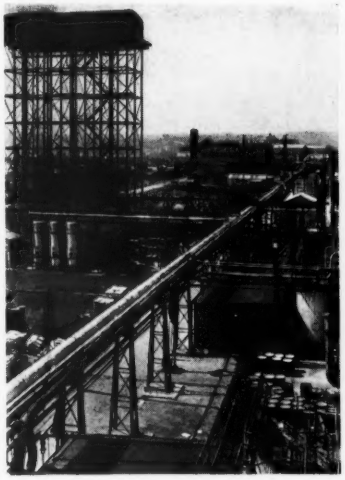
I was delighted to be able recently to visit once again the works of Catalin, Ltd., at Waltham Abbey, and to note the expansion since my last visit before the war, when production was confined to the making of phenolic cast resins. Catalin must be the only factory in the country and one of the very few in the world still producing them. During the war the emphasis was transferred to the production of impregnated resins and synthetic glues, and today this embraces also shell moulding resins for metallurgy and polyester resins, which latter have features of exceptional promise. Dr. Gilbert, who showed me round the plant, held back a quite delightful piece of news for me until the end of my visit. As we went into the research laboratories he said, " Would you like to meet an old friend of yours again? " The friend was E. Leighton Holmes, newly joined to the staff. He and N. J. L. Megson, now head of the Chemistry Department of the Royal Aircraft Establishment at Farnborough, and K. W. Pepper, now of the British Leather Manufacturers' Research Association, were three of Sir Gilbert Morgan's bright boys at the Government Chemical Laboratories at Teddington many years ago. Leighton Holmes specialized in those interesting compounds the ion-exchange resins, and later left to translate the discoveries into industrial usage. My best wishes to Catalin, Ltd., and to Holmes for a very happy future.

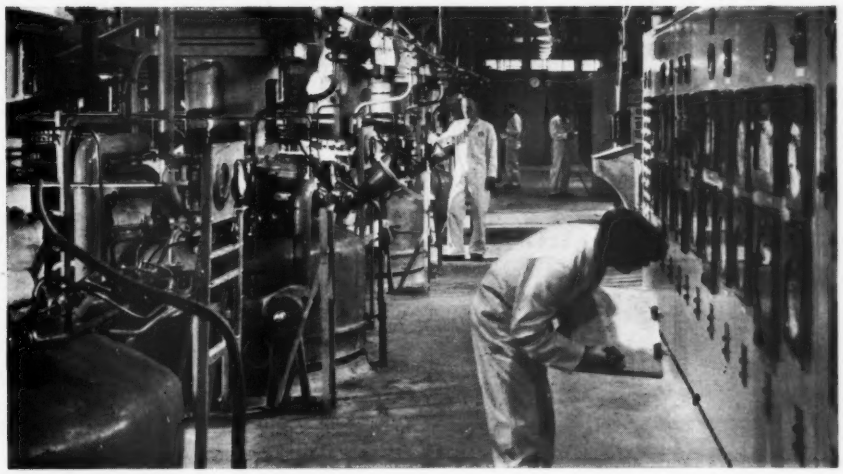
◆ ◆ ◆

Silvered Acetate Film

Of all the applications of the vacuum metallization process perhaps the most difficult has been, for obvious reasons, the continuous coating of plastic film and sheet. Following a recent visit to the works of Utilex, Ltd., I have seen some of the results of successful continuous coating of cellulose acetate and no doubt the news of this new development will be received with pleasure by makers of light toys and decorations, especially for the Christmas trade, by advertisement and publicity experts and by special sections of the packaging industry. The appearance of such coated films, produced by the volatization of silver, is remarkable for the brilliant mirror-like finish which makes one wonder if there are any applications in more technical fields. One possible application at once springs to mind —their use in covering the outside of tanks containing volatile solvents, e.g., petrol, to prevent loss by evaporation—a loss sufficiently large in all refineries and tank-farms normally to warrant frequent painting with light-reflecting paint, e.g., aluminium paint. At first sight, what must be a comparatively costly film would not appear to have any economic chance against paint. But this may prove a fallacy on close analysis. It is already practical to treat the back of the new film with a self-adhesive layer and since the film is available in rolls it should not prove beyond the wit of man to evolve a rapid means of unrolling and applying vertically, thus reducing the very high cost of labour in painting to a very small fraction of it. The efficiency of the metallized film would be very much greater than aluminium paint, although the sight of mirror finishes on tanks might be disconcerting; nor, obviously is anything known about the " life " of such a film, but we can presume that it would approach that of a paint film which for efficiency is generally renewed every year. Moreover the possibility of using very strong film, e.g., of the type of Terylene, is not out of the question. Another thought that passes through my mind is the construction of easily replaceable mirrors laid on cheap but accurate bases instead of costly glass for examining the possibility of utilizing the heat from the sun.

DOGSBODDY.





The Next Ten Years . . .

Our June, 1953 issue, which coincided with the second British Plastics Exhibition, reproduced an article under the above title written by the Editor of Plastics *for* The Director, *the Journal of the Institute of Directors. It was one of 33 contributions, each describing the progress of an industry and the path it was expected to cut and tread. We were especially impressed by the foreword by the President of the Institute, Major-General Sir Edward Spears: "The decision to focus attention on the next ten years in British Industry rather than to discuss the past is a wise one. For plainly these will be momentous years during which the commercial and industrial fate of this country could easily be settled. And it is right that we who bear the responsibilities of leaders should be forward looking and ready to adapt ourselves to the developments which are in store for us." There must be very few readers who will deny the truth of these words.*

TWO years appear to be a very short period in the life of an industry to show any significant change, other than that of mere economic movements, of increased or decreased business. Yet there is much to report for the plastics industry, and the reason, we believe, is not far to see since, based on raw materials almost wholly synthetic in character and based on rapidly expanding sciences, it owes no allegiance to age-long traditions, as does almost every other industry whose roots are buried in the historic periods of complete absence of what we call technology.

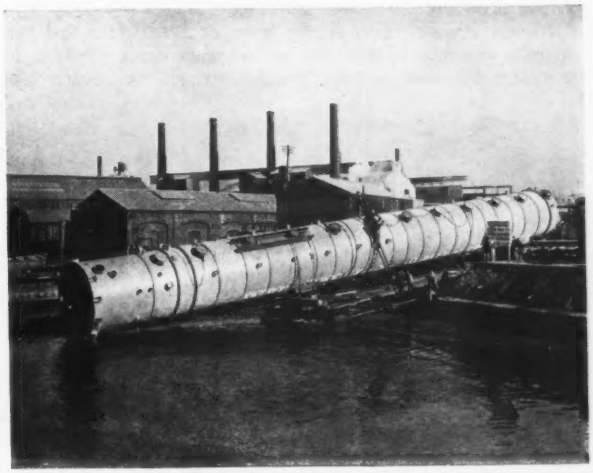
Perhaps the greatest change in the industrial face of Great Britain which affects the plastics industry especially, is in the creation of a petrochemical industry—in the adoption of petroleum as a new source of supply, side-by-side with coal of our chemical and plastic raw materials.

Prior to 1949 the British plastics industry was almost entirely based on coal as a raw material, which not only limited the number of synthetic resins available, but also made it depend on the only natural organic compound we possess in large quantity, on a material for which there is an enormous and growing demand as fuel, but the resources of which are diminishing, increasing in cost and with a continuously diminishing labour force to extract it. By 1949 a number of petroleum distillation companies had decided to erect plants for chemicals from petroleum manufacture. By 1953 the work was well advanced and today some of the refineries and cracking plants are in production. Ethylene is now being produced thus, instead of from costly alcohol for polythene and Terylene, and in 1955 two companies announced their decisions to manufacture certain synthetic rubbers also derived from petroleum. This latter production is exceptionally important, not only in many branches of technology but in other walks of life. Its lack indeed has seriously hindered the production of " long-life " shoes.

Production, therefore, during the two intervening years has expanded greatly and in 1954 reached a total of 250,000 tons, valued at £56,000,000, a record in the history of plastics. This was accompanied by a record export figure of £20,000,000, compared with £13,000,000 in 1952. The export of finished goods are difficult to compute since they are generally in the form of components of other exported structures or units, such as aircraft, motorcars, electrical equipment of all types, refrigerators, and so on. As a corollary, the production, home and overseas sales of moulding machinery has grown greatly. A close estimate of this is given.

Raw Materials

The most spectacular and outstanding event of the past year is one that was not noted at all in the aforementioned review. It has been known that the I.C.I. Terylene plant was under construction, but its opening in January, 1955, came as a



Top of page (left), British Resin Products Ltd. plant at Barry and (right) the autoclaves in I.C.I.'s Terylene plant at Wilton. Above, 140 ft. distillation column made by G. A. Harvey & Co. Ltd., leaving Thames-side for towage to Grangemouth, Scotland and the new works of Forth Chemicals Ltd.

General view of moulding shop at the St. Helens Works of Ashdowns Ltd.

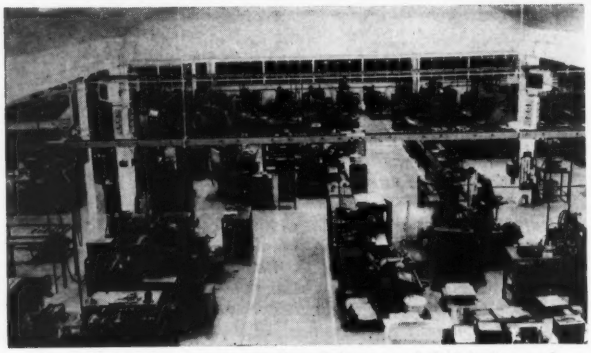
comforting surprise. Its main raw materials are produced from petroleum, as already stated, and the polymer produced on the plant in the form of a thick tough sheet or " ribbon " is converted into chips which are fed directly and continuously to the yarn and filament plant. Thus, under " one roof " of 30 acres there is being produced 5,000 tons a year of the new, amazingly strong fibre—a production which will, during the next year, expand to 10,000 tons. This obviously is not all, for the plant will produce a new packaging film one-tenth the thickness and still as strong as the best existing ones. High cost per lb. thus scarcely affects cost of packaging.

During the past two years the production of thermoplastics has increased greatly, especially that of p.v.c., polythene and polystyrene. I.C.I.'s capacity in 1953 was probably of the order of 20,000 tons p.v.c. per annum and is steadily increasing to double that quantity. By 1956 it is hoped to reach the 45,000-tons mark. British Geon's production of the same material has risen to 27,000 tons. In spite of these increases, there is still a shortage. The demand is increasing in many fields to an extent which may be gauged from one single demand of 10,000 tons a year for belting in coal mines in this country alone. British Geon is to begin manufacture of saran, a specific copolymer of vinyl chloride and vinylidene chloride, hitherto not made in this country.

Polythene similarly finds continually increasing uses, production at present being of the order of 35,000 tons and will increase to about 55,000 tons in two years hence. Nylon, in less demand than the foregoing materials, is nevertheless finding special uses, production last year being about 500 tons but is steadily increasing to the 1,000-tons-a-year mark. This refers, of course, to the moulding powder and not to yarn for spinning or to monofilament.

Polystyrene production has also increased rapidly. It was about 15,000 tons per annum in 1953 and has now reached a figure of 30,000 tons. The manufacture at Forth Chemicals, Ltd., of the monomer is in process of being doubled to 20,000 tons a year. Another of the general activities in the polystyrene field is the production of a high impact quality by mechanical mixture with synthetic rubber by several companies. Concurrently, British Resin are in process of erecting a new plant for the manufacture of a modified styrene to give the eminently desirable high impact strength. A new process is being introduced.

One of the most important announcements this year has been the decision by British Oxygen Co., Ltd., to make the monomer, vinyl acetate, in this country. Hitherto it has been imported, by companies making the polymer, from Europe.

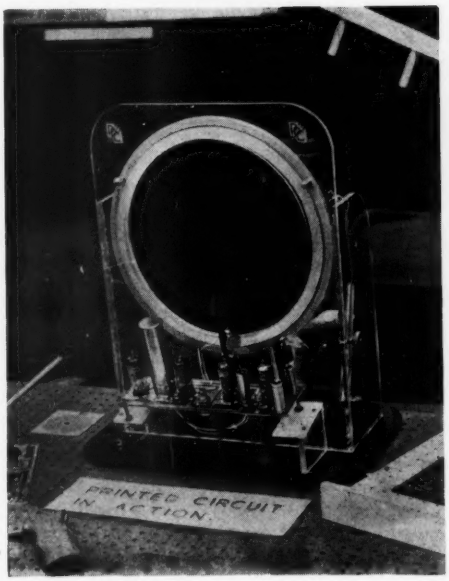


One of the six bays at the No. 2 factory of C.V.A. Jigs and Tools Ltd.

It must be remembered that polyvinyl acetate is now being very widely used as adhesives and in paint manufacture and since it is also important as an intermediate in the manufacture of polyvinyl alcohol, butyral and other polyvinyl acetals, production of the monomer in this country has many advantages.

The past two years have seen the emergence in the thermosetting field of new alkyd resins for the compression moulding industry. These serve a purpose that has long been sought in the industry, namely, the cutting down greatly of the time of curing in the press, a factor upon which this section of the moulding industry depends so much economically. The new resins can be cured in the mould in from 10 seconds

Decorated tableware: On the left is a plate by Ranton and Co. Ltd., the design having been applied by means of a thin paper transfer. Above are melamine and urea cups and saucers, hand painted, and afterwards coated with resin and stoved purely as an experiment, suggestive of possibilities.



(Above) Twin-mould for vacuum forming, made in light alloy by Latymer Engineering Ltd.

(Left) Printed circuit for radio receiver by Ashdowns Ltd.

upwards, depending on thickness of moulding and on temperature. Suitable presses are now available to control closely the more stringent conditions necessary.

New Developments with Thermoplastic Compounds

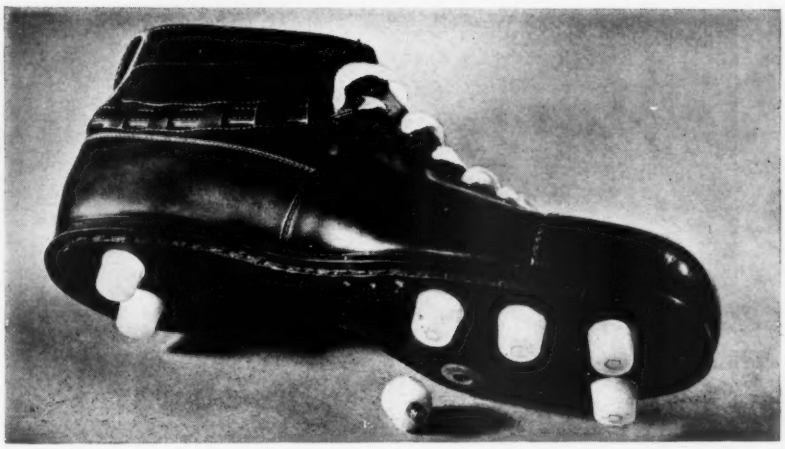
Outstanding productions from thermoplastic materials are many. Manufacture of the polythene-covered cable for the first transatlantic telephone is progressing at a very high rate at the Ocean Works of Submarine Cables jointly owned by Telegraph Construction and Maintenance Co., Ltd., and Siemens Brothers, Ltd. It is also pleasing to report that the huge extruding and spreading machine installed last year at the new plastics division of Telcon for coating paper and cardboard with polythene is proving highly successful. B.X. Plastics are extruding 16-in. polythene piping for use in acid waste drainage and 16-in. cellulose acetate tubing for unspecified special jobs. The production of polythene bottles for packing pharmaceutical powders and liquids has proved an unqualified success, while the extrusion-blowing technique for making nylon bottles capable of high-temperature sterilization has also been achieved. With regard to sterilizable surgical apparatus, hundreds of thousands of nylon hypodermic syringes are now being injection moulded with great success—a high precision job of great merit. News of interest to the advertising field is the continuous production of vacuum metallized acetate film with the achievement of mirror finishes in silver. Of supreme technical importance are the great strides made in the welding of hard p.v.c. for chemical and allied purposes.

New Developments with Thermosetting Compounds

Although the production of thermoplastics is growing at a much greater rate than the much older thermosetting compounds, developments in the use of the latter continually appear. Two or three years ago their use in the production of thin shells of bonded sand for use in metal casting quite suddenly became a highly developed process.

The melamine resins have progressed, too. The electrical industry uses relatively small quantities because of the comparatively high price, but the great demand for table tops, counters, decorative panels of laminated phenolics with layers of melamine impregnated sheet has proved one of the most impressive outlets for this material. Moulded melamine tableware had proved a slow starter a few years ago, but the exceptional strength of melamine cups, saucers and plates has proved so economical compared with what has proved to be the frighteningly high rate and cost of breakages when using chinaware, that canteens, aircraft companies and similar organizations are turning over to their use.

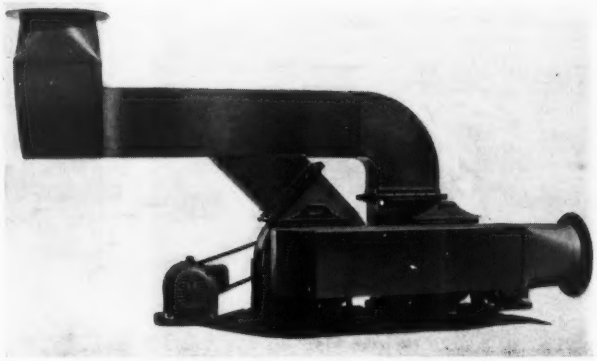
(Right) Acrylic sheet was used in the fabrication of this display stand.
(Below) Football boots fitted with nylon studs moulded by G.E.C. Ltd.



Within the past year or so melamine tableware has been the subject of much experimentation in an attempt to decorate the surfaces with a transferred motif. The experiments, which have proved quite technically successful, consist of moulding a cup, saucer or plate with a "half" cure, applying the design made on melamine impregnated paper and then completing the cure in a separate press. An alternative experiment, so far unproved as to serviceability of surface, was suggested in this journal: painting on a completely cured cup, lacquering the whole with a sprayed resin, and then finally stoving to secure protection for the applied design.

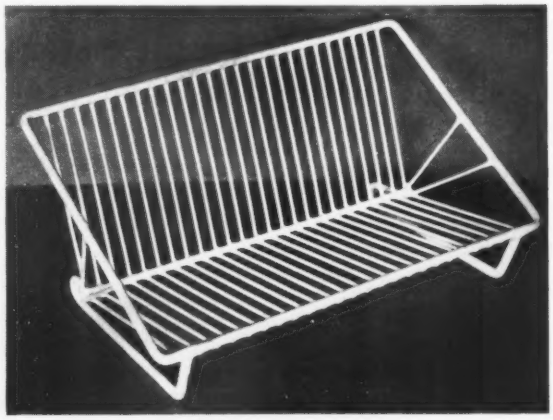
The production of high strength reinforcements from glass-fibre/polyester complexes, after two or three years of badly conducted and badly directed propaganda in the United States and to only slightly less extent in this country and Europe, has resulted in a much more worthy attempt to get down to an analysis of their properties and limitations and to a better segregation of application. There is fortunately a clear indication that experts only—chemists, physicists, engineers—are the most suitable persons to govern such manufactures in the initial stages. We are now seeing, for example, important companies such as Tube Investments, Ltd., Stewart Lloyd's, Dunlop Rubber Co., Ltd., all "outside" the plastics industry entering the field—in these cases, of tube manufacture.

To date, much of the work is being directed to production of components for aircraft and very high-speed guided missiles, while considerable quantities of simple structures, e.g., protective helmets, corrugated translucent roofing, chairs and the lining of special lorries appear to be the most interesting outlets at present. Several companies are making sports car bodies and motorcycle and sidecar shells are also in the market. There is also considerable activity in a few aircraft factories in the production of high-strength structures made from asbestos-phenolic resin laminates. A good rate of manufacture of drop fuel tanks for jet aircraft made from this type of material has been reached.



Rigid p.v.c. fume ducting by Turner & Brown Ltd., Bolton. The structure is 14½ feet long and 7½ feet at highest point.

For the first time a successful and worthy attempt to enter the hardware market with phenolic resin bonded wood laminate has been made by Wm. Mallison and Sons (Mfg.), Ltd., who are now marketing solid fuel hods or buckets for the domestic fireplace. The normal cone-shaped type of galvanized iron sheeting has always been a notoriously weak structure especially so far as the fast rusting base is concerned. The lip of the new type has been found to be exceptionally resistant to erosion when the hod is used to scoop coke directly.



PLASTICS FOR THE HOUSEHOLD

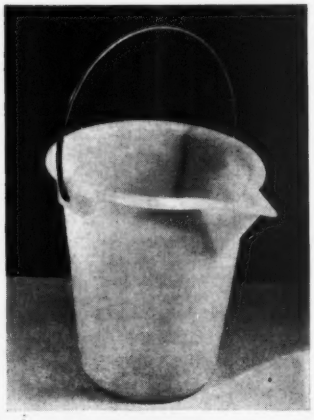
(Left) P.V.C. dip coated plate rack

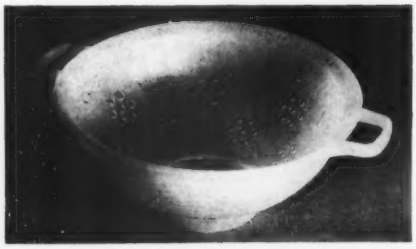
(Right) Polythene bucket.

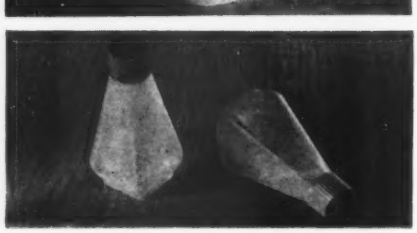
(Left, centre) Polythene colander.

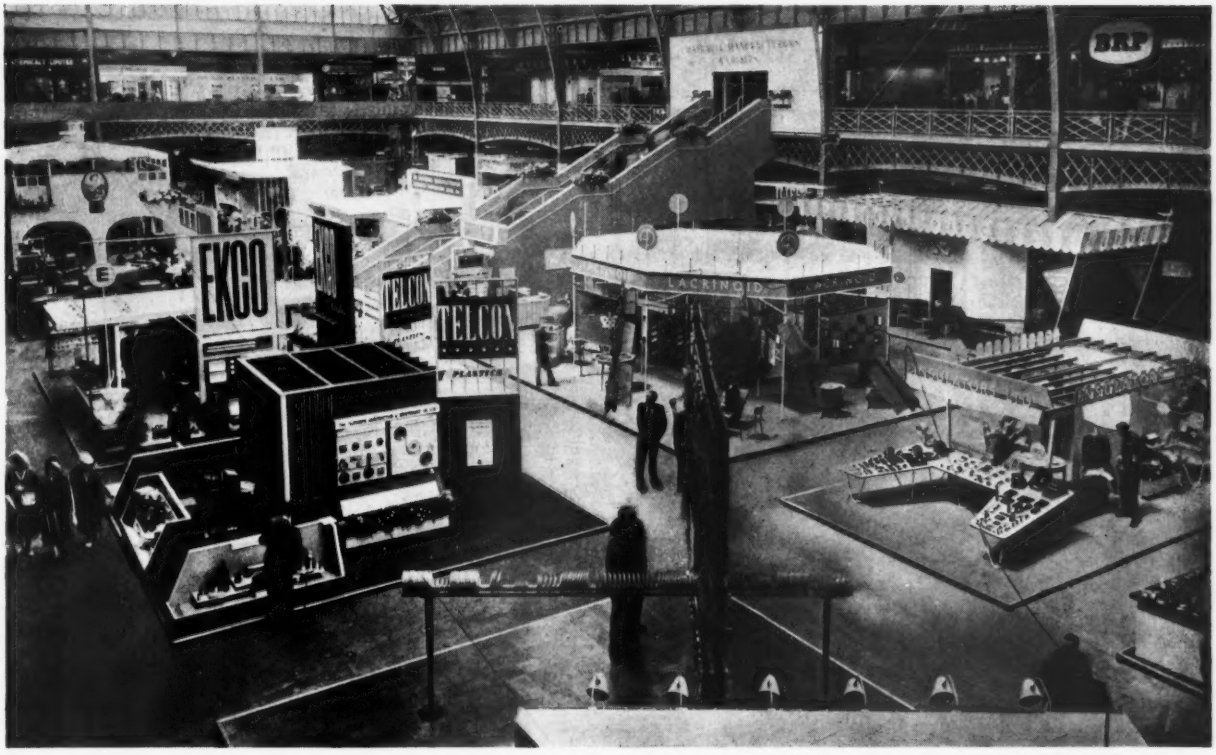
(Left, below) Condiment set in polythene.

(Below) Bucket and bowls, injection moulded in polythene.









THE BRITISH PLASTICS EXHIBITION

A Special Supplement to "Plastics"

WHEN the first British Plastics Exhibition was held in 1951, there were many who doubted if the plastics industry of this country was large enough to support a full-scale London Exhibition of its own. Doubts vanished in the face of great success; not only was that first exhibition a success technically, but it also drew the public who, for the first time, could see for themselves the contribution of plastics materials to everyday life and to industry.

The Exhibition of 1955 is the third to be held, and the companies who have taken stands may be said to be truly representative of the industry as a whole. Under the roof of the National Hall, Olympia, is to be found a valuable demonstration of the progress the industry has made during the past two years. In materials, machinery and fabricating techniques, advances have been substantial since 1953, when we were last able to take stock on an industry-wide scale.

The special supplement which follows will serve, we hope, a twofold purpose. The immediate objective is to provide a concise summation of what is to be seen at the Exhibition, paying special attention to new and important developments. In addition, this special issue of *Plastics* will be read by many subscribers to the journal throughout the world who have been unable to attend the Exhibition in person. For them the supplement will serve to mirror the state of our industry as at June, 1955.

In presenting this survey of the Exhibition we have distributed some 200 circular letters and forms. The result will be found on the following pages, broken down for the convenience of the reader into three main sections: Materials Manufacturers, Plant and Equipment Manufacturers, and Moulders and Fabricators. Below is a guide to the supplement for quick reference.

In each section, the Exhibition stands are described, in alphabetical order. An additional feature in each section is a table which will be found especially useful by those seeking specific commodities or facilities. In the Materials Section a table lists the products of each manufacturer, indicating at the same time the manufacturing processes for which the materials are suitable. Similarly, in the moulding section, a table indicates the various fabricating processes carried out by each exhibitor, showing also the materials employed in each case.

The guide to this special supplement, on this page, will assist in locating any item of special interest, and on the following page will be found an alphabetical list of exhibitors, giving stand numbers and also showing in which section of the supplement an exhibitor is to be found.

GUIDE TO SUPPLEMENT

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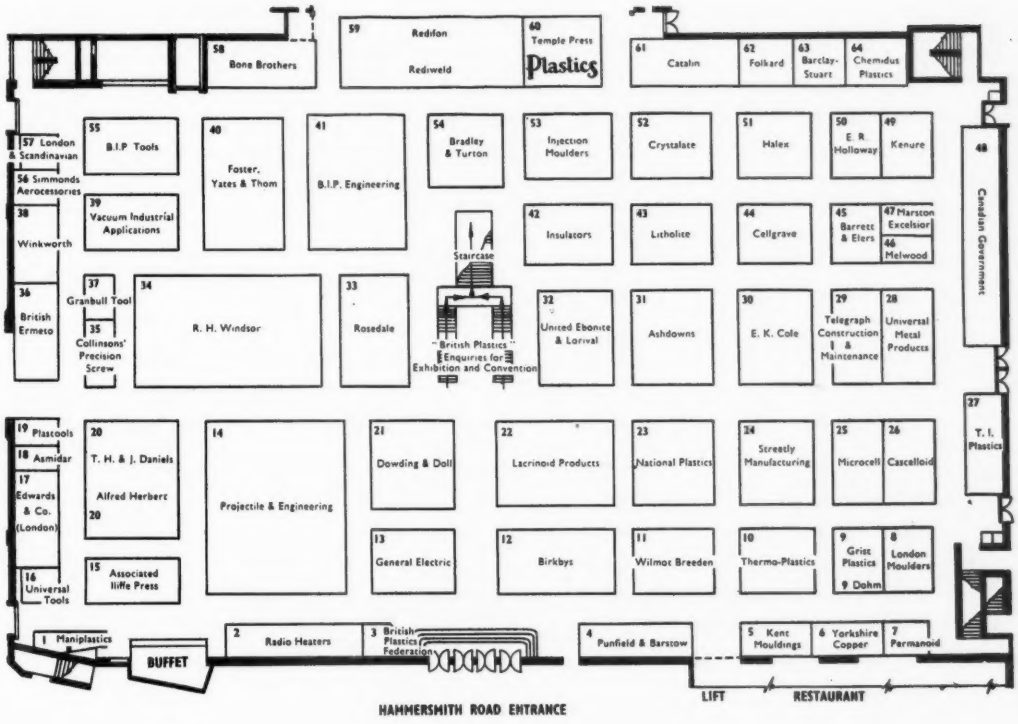
EXHIBITORS

Companies showing at the Exhibition are listed here in alphabetical order. In each case the stand number is given, together with a key letter denoting the section of the supplement in which a description of the exhibitor's stand will be found.

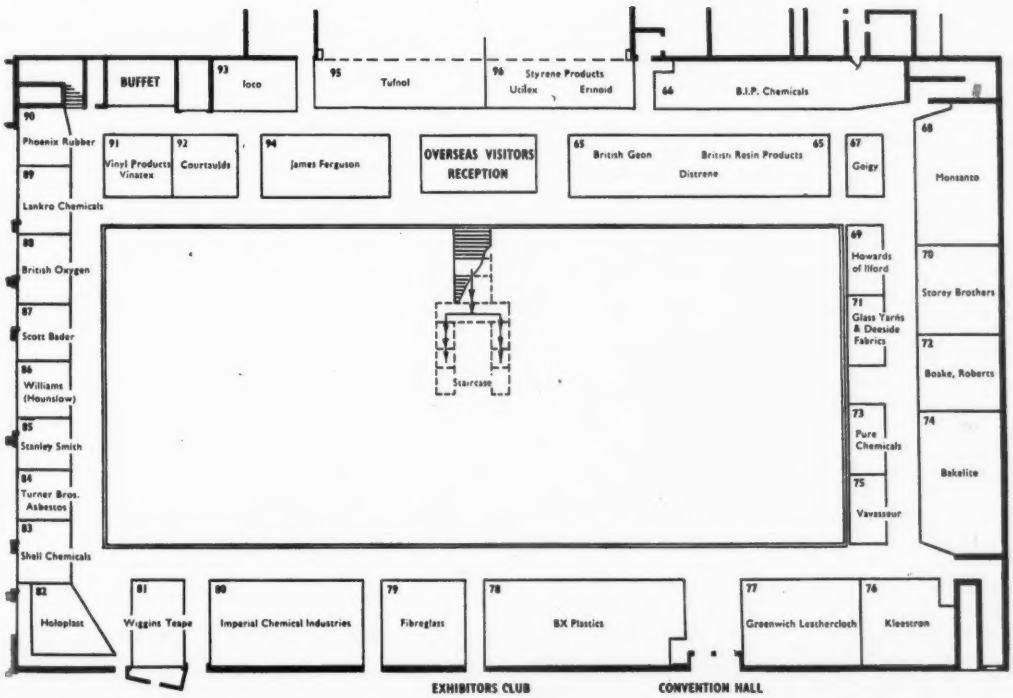
R = Manufacturers of raw materials, moulding compounds, etc. P = Manufacturers of plant and equipment. M = Moulders and fabricators. O = Press and official.

Exhibitors	Stand No.	Section
Arborite Co., Ltd.	48	M
Ashdowns, Ltd.	31	M
Asmidar Plastic Moulding Machines, Ltd.	18	P
Associated Iliffe Press, Ltd.	15	O
B.I.P. Chemicals, Ltd.	66	R
B.I.P. Engineering, Ltd.	41	P
B.I.P. Tools, Ltd.	55	P
BX Plastics, Ltd.	78	R
Bakelite, Ltd.	74	R
Barclay-Stuart (Plastics), Ltd.	63	M
Barrett and Elers, Ltd.	45	M
Birkbys, Ltd.	12	R & M
Boake, A. Roberts and Co., Ltd.	72	R
Bone Brothers, Ltd.	58	P
Bradley and Turton, Ltd.	54	P
British Ermeto Corporation, Ltd.	36	P
British Geon, Ltd.	65	R
British Oxygen Co., Ltd.	88	R
British Plastics	15	O
British Plastics Federation	3	O
British Resin Products, Ltd.	65	R
Canadian Chemical and Cellulose Co., Ltd.	48	R
Canadian Government Exhibit	48	R & M
Canadian Industries (1954), Ltd.	48	R
Canadian Resins and Chemical, Ltd.	48	R
Cascelloid	26	M
Catalin, Ltd.	61	R
Cellgrave Co., Ltd.	44	M
Chemidus Plastics	64	M
Cole, E. K., Ltd.	30	M
Collinson's Precision Screw Co., Ltd.	35	P
Courtaulds, Ltd.	92	R
Crystalate, Ltd.	52	M
Daniels, T. H. and J., Ltd.	20	P
Distrene, Ltd.	65	R
Dohm, Ltd.	9	R
Dowding and Doll, Ltd.	21	P
Ebonestos Industries, Ltd.	52	M
Edwards, W., and Co. (London), Ltd.	17	P
Erinoid, Ltd.	96	R
Ferguson, James, and Sons, Ltd.	94	R
Fibreglass, Ltd.	79	R
Folkard-Ferry, Ltd.	62	M
Foster, Yates and Thom, Ltd.	40	P
Geigy Co., Ltd.	67	R
General Electric Co., Ltd.	13	M
Glass Yarns and Deeside Fabrics, Ltd.	71	R
Granbull Tool Co., Ltd.	37	P
Greenwich Plastics, Ltd.	77	M
Grist Plastics, Ltd.	9	R
Halex	51	M
Herbert, Alfred, Ltd.	20	P
Holloway, E. R., Ltd.	50	R & M
Holoplast, Ltd.	82	M
Howards of Ilford, Ltd.	69	R
Imperial Chemical Industries, Ltd.	80	R
Injection Moulders, Ltd.	53	M
Insulators, Ltd.	42	M
Ioco, Ltd.	93	M
Kent Mouldings	5	M
Kenure, J. F., Ltd.	49	M
Kleestron, Ltd.	76	R
Lacrinoid Products, Ltd.	22	R & M
Lankro Chemicals, Ltd.	89	R
Litholite Insulators and St. Albans Mouldings, Ltd.	43	M
London Moulders (Plastics), Ltd.	8	M
London and Scandinavian Metallurgical Co., Ltd.	57	P
Maniplastics, Ltd.	1	P
Marston Excelsior, Ltd.	47	M
Melwood Thermoplastics, Ltd.	46	M
Mica Products, Ltd.	52	M
Microcell, Ltd.	25	M
Monsanto Chemicals, Ltd.	68	R
Monsanto (Canada), Ltd.	48	R
National Plastics (Sales), Ltd.	23	M
Naugatuck Chemicals	48	R
Northern American Cyanamid, Ltd.	48	R
Northern Pigment, Ltd.	48	R
Peco Machinery (Westminster) Sales Ltd.	14	P
Permanoid, Ltd.	7	M
Phoenix Rubber Co., Ltd.	90	M
Plastics	60	O
Plastools (London), Ltd.	19	P
Polymer Corporation, Ltd.	48	R
Projectile and Engineering Co., Ltd.	14	P
Punfield and Barstow (Mouldings), Ltd.	4	M
Pure Chemicals, Ltd.	73	R
Radio Heaters, Ltd.	2	P
Redifon, Ltd.	59	P
Rediweld, Ltd.	59	M
Richmond Plastics, Ltd.	48	M
Rosedale Associated Manufacturers, Ltd.	33	M
Scott Bader and Co., Ltd.	87	R
Shawinigan, B. A., Ltd.	48	R
Shawinigan Chemicals, Ltd.	48	R
Shell Chemicals, Ltd.	83	R
Shirlite Products of Canada	48	M
Simmonds Aerocessories, Ltd.	56	P
Smith, Stanley and Co.	85	M
St. Maurice Chemicals, Ltd.	48	R
St. Regis Paper Co. (Canada), Ltd.	48	M
Storey Brothers and Co., Ltd.	70	M
Streetly Manufacturing Co., Ltd.	24	M
Styrene Products, Ltd.	96	R
T.I. Plastics, Ltd.	27	M
Telegraph Construction and Maintenance Co., Ltd.	29	M
Temple Press Ltd.	60	O
Thermo-Plastics, Ltd.	10	M
Tufnol, Ltd.	95	M
Turner Bros. Asbestos Co., Ltd.	84	R
United Ebonite and Lorival, Ltd.	32	M
Universal Metal Products, Ltd.	28	M
Universal Tools, Ltd.	16	P
Utilex, Ltd.	96	R & M
Vacuum Industrial Applications, Ltd.	39	M
Vavasseur, J. H., and Co., Ltd.	75	R
Vinyl Products, Ltd.	91	R
Warerite, Ltd.	74	M
Wiggins Teape and Alex Pirie (Sales), Ltd.	81	R
Williams (Hounslow), Ltd.	86	R
Wilmot Breeden, Ltd.	11	M
Windsor, R. H., Ltd.	34	P
Winkworth Machinery, Ltd.	38	P
Yorkshire Copper Works, Ltd.	6	M

PLAN OF GROUND FLOOR STANDS



Where To Find Exhibitors



PLAN OF FIRST FLOOR STANDS

Urea Formaldehyde moulding powder manufacture at B.I.P. Chemicals.

MATERIALS MANUFACTURERS

B.I.P. Chemicals Ltd. 66
Popes Lane, Oldbury, Worcestershire.
Urea and melamine moulding powders and resins, polyester low-pressure laminating resins.

THIS stand constitutes an outstanding display of structural mouldings, made from glass fibre reinforced Beetle polyester resins. Since the 1953 British Plastics Exhibition considerable development progress has been made and examples are shown of productions made by the low-pressure moulding and hand lay-up methods.

In addition, items made from the well-known standard Beetle moulding materials or incorporating Beetle resins are on show. Of special interest is Beetle BW, the new wood-filled urea moulding powder, mouldings from which have a surface finish of exceptional quality.

BX Plastics Ltd. 78
Higham Station Avenue, Chingford, London, E.4.
Thermoplastics, raw materials, sheets, rods, tubes, etc.

THE BX stand this year is again one of the largest in the exhibition, but instead of giving a comprehensive display of the range of thermoplastic materials produced by the company, the accent has been placed on three of the newest production materials, namely Cobex, a rigid vinyl sheet, Velbex, a flexible vinyl sheet (with particular reference to printed Velbex), and Bextrene polystyrene moulding powder.

Cobex, which is shown in the form of sheets, blocks and continuous sheeting, has greatly increased its range of usefulness and, in particular, is now playing a prominent part in the manufacture of chemical plant, where the qualities of toughness, ease of manipulation and fabrication, combined with non-corrodibility, make this material outstandingly suitable for plant construction, particularly with regard to fume exhaust and ducting, and the lining of baths for chemicals for plating, etc. With regard to Velbex flexible vinyl, the increase in the popularity of printed Velbex makes this display of particular interest.

The Bextrene crystal polystyrene moulding powder is now renowned for its clarity. The wide range of other colours available has recently been increased with the addition of several pearlescent shades. The more traditional products of BX Plastics are represented in a separate display running the entire length of the back of the stand.

Bakelite Ltd. 74
12-18 Grosvenor Gardens, London, S.W.1.
Moulding materials, laminates, sheets and synthetic resins.

MATERIALS supplied by the company and the wide range of applications for them are shown, with emphasis on new and improved grades. Amongst moulding materials, in addition to standard phenolic and urea compounds, may be mentioned rubber-modified and glass-filled grades for greater strength and alkyds with improved electrical and colour properties. Bakelite laminated sheet, rod and tube include grades based on paper, fabric, asbestos, glass fabric, densified and impregnated wood, and also copper-clad materials for printed circuits. The range of Bakelite resins for woodworking, lamp- and valve-capping, etc., is shown, and, in addition, a variety of resins and other materials for the production of foundry shell moulds and cores. At the same time, a further section demonstrates the increasing use being made of Bakelite polyester and epoxy resins, both for large reinforced structures such as boats, car bodies, commercial vehicles, etc., and for the production of small articles requiring strength combined with light weight and non-corrosion.

The company's Vybak range of p.v.c. thermoplastics is on view and includes resins, extrusion and injection-moulding materials, and coloured and transparent grades of both rigid and elastomeric sheet. Features of this group of materials are the work being done by Vybak industrial rigid sheet for the supply of chemical-resistant ducting, tanks and other plant, and their growing importance as vacuum-forming materials. Amongst other recent developments on show are polystyrene monofilaments.

Birkbys Ltd. 12
Liversedge, Yorkshire.
Manufacturers of moulding powders, phenolic resins, cements and varnishes.

SHOWN are samples of the company's products, including a wide selection of technical, compression and transfer mouldings made from Elo moulding powders, the company's proprietary product. Also shown are resins for bonding, laminating and impregnating purposes, insulating varnishes, cements and lacquers, anti-friction resins for fabric bearings, capping cements, filling compounds and sealing fluids.

Boake, Roberts and Co., Ltd., A. 72
Carpenters Road, London, E.15.
Manufacturers of plasticizers, stabilizers and industrial chemicals.

THE company is exhibiting examples of the latest products in the field of plasticizers and stabilizers. Of especial importance are the epoxidize oils, giving excellent results in stabilizing vinyl chloride polymers. New stabilizers in other materials, such as the cellulose esters and ethers, are also shown.

Also featured are such additions to the Boake Roberts range as anti-static agents, a heat-transfer fluid and reodorants for use in various types of plastics.

British Geon Ltd. **65**
Devonshire House, Piccadilly, London, W.1.
P.v.c. and copolymer resins, vinyl latices and compounds, hycar synthetic rubbers, styrene-butadiene copolymers and poly-acrylic rubbers.

THE full Geon range of polyvinyl materials manufactured by British Geon Ltd., at Barry, Glamorgan, comprises the following types (sold abroad under the trade name Breon): Geon p.v.c. resins; Geon copolymer resins; Geon p.v.c. paste resin; Geon vinyl latices; Geon vinyl compounds; Geon masterbatch colours (for compounds).

The most prominent feature of the British Geon display—on an island site occupied by the three plastics companies in the Distillers Industrial Group—is a full-scale model of a coal-mine, complete with three miners shovelling coal on to a 20-ft. conveyor belt made with Geon p.v.c. Other uses of p.v.c. in the mines are also displayed, including p.v.c. ventilation tubes, p.v.c.-coated brattice cloth, cables sheathed and insulated with p.v.c. and p.v.c. protective clothing as supplied to the National Coal Board.

Another section of the display features p.v.c. wall-panelling, p.v.c. floor covering and p.v.c. upholstery material. The use of Geon p.v.c. in rigid form is illustrated by a representative selection of chemical plant and industrial equipment, as well as a number of products such as refrigerator parts, road signs, etc., fabricated in rigid p.v.c.

British Oxygen Co., Ltd. **88**
Bridgewater House, Cleveland Row, London, S.W.1.
Melamine, polyvinyl acetate, vinyl acetate and polyvinyl pyrrolidone.

TO illustrate the wide range of products which can be made incorporating melamine, many examples are shown of products ranging from tableware to textiles.

Polyvinyl acetate, another product of the company, made in granule and emulsion form, is shown in many uses, such as emulsion paints, printing inks, flooring and adhesives. Polyvinyl pyrrolidone for the textile industry, photography, cosmetics and adhesives is also featured.

British Resin Products Ltd. **65**
Devonshire House, Piccadilly, London, W.1.
Resins, moulding materials and adhesives.

THE theme of the B.R.P. stand is "Plastics in Transport." The displays are designed to show how the wide range of synthetic resins, moulding materials, adhesives and allied products manufactured by B.R.P. at Barry, Glamorgan, are being employed in the construction and equipment of the various forms of transport.

Many of the latest structural materials now being employed—based on Cellobond adhesive, laminating and polyester resins—can be examined. One of the exhibits is a 13-ft. 4-in. launch with many ancillary plastics parts, including, in addition to the polyester/glass fibre hull, a petrol tank of the same material. Cellobond phenolic-resin glues are used in the joinery work, and in the production of the plywood used in the deck. The sterntube, the bearings for the rudder stock, and the bushes for the steering column illustrate three excellent ways in which Cellobond laminating resins can be used. The marine finishes on the boat underline one field of use of the epikote range of surface coating resins. P.v.c.-coated fabric is used for the upholstery.

The contribution made to transport efficiency by Cellobond brake-lining resins is emphasized.

Of particular interest to the rubber industry are Cellobond rubber-compounding resins. These comprise reinforcing resins for both natural and synthetic rubber and resin for adhesives. Both these types play a useful part in filling the transport industry's needs. Many types of plastics mouldings are used in modern transport, and the displays illustrate the comprehensive range of moulding materials—Rockite phenolic and urea, Cellomold cellulose acetate and Styron polystyrene (shortly to be made at Barry by Distrene Ltd.). The exhibits also include examples of Rockite phenolic extrusions—made solely by B.R.P. —specially designed for use in coachwork.

Canadian Government Exhibit **48**
Commercial Division, Office of High Commissioner for Canada, Canada House, London, S.W.1.

CANADIAN industry is represented on this stand by 15 companies. In the raw-material field are the following companies: B. A. Shawinigan Ltd., manufacturing phenol, acetone and other derivatives from cumene; Canadian Chemical and Cellulose Co., Ltd., showing a full range of petrochemicals for use in the plastics industry; Canadian Resins and Chemicals Ltd., manufacturing vinyl materials and compounds; Monsanto (Canada) Ltd., featuring polystyrene, p.v.c. compounds, urea formaldehyde, plywood adhesives and plasticizers; Naugatuck Chemicals, manufacturing polyesters, resins and adhesives; North American Cyanamid Ltd., manufacturing intermediates for melamine; Northern Pigment Ltd., manufacturers of synthetic iron oxides; Polymer Corporation Ltd., manufacturing synthetic rubber; Shawinigan Chemicals Ltd., manufacturing industrial chemicals; St. Maurice Chemicals Ltd., manufacturers of pentaerythritol and formaldehyde.

Catalin Industrial Resins Ltd. **61**
Waltham Abbey, Essex.
Synthetic adhesives, emulsions, casting resins and polyester resins.

THE company has for many years specialized in the manufacture of casting phenolic resins. Examples of fabrications from these materials are shown. In addition, the range of polyester resins now manufactured by the company is demonstrated in various applications including corrugated roof lighting.

Courtaulds Ltd. **92**
Little Heath, Coventry.
Thermoplastic sheet and film.

THIS display demonstrates the diverse applications that are possible with cellulose derivatives. Of special interest is the range of acetate sheet introduced for vacuum-forming purposes.

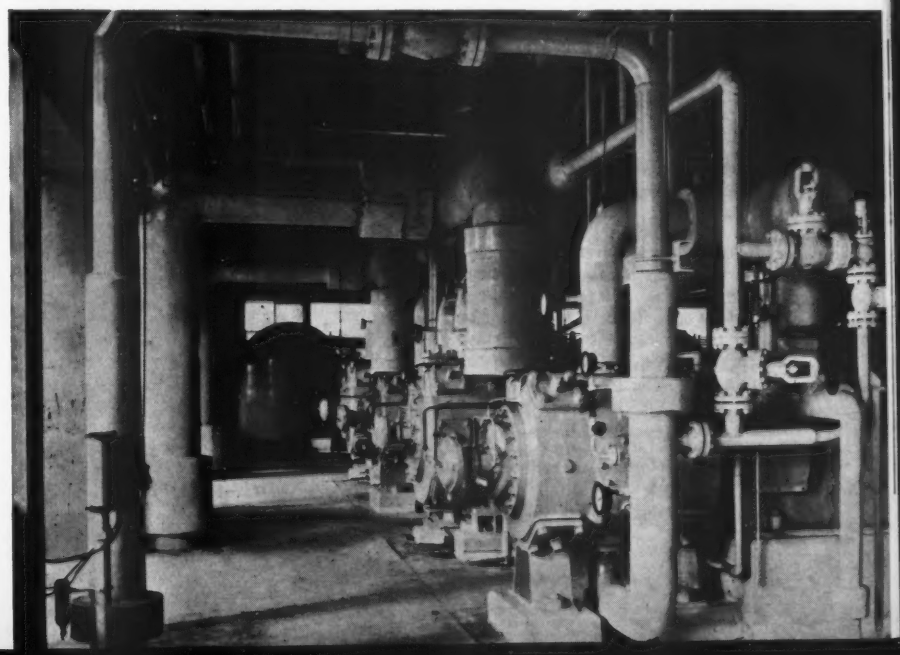
Distrene Ltd. **65**
Devonshire House, Piccadilly, London, W.1.
Polystyrene moulding materials.

THE main theme of the Distrene Ltd. display is "Plastics in the Home." Products made with polystyrene are displayed in the settings of a full-scale kitchen and living-room. Plastics materials made by

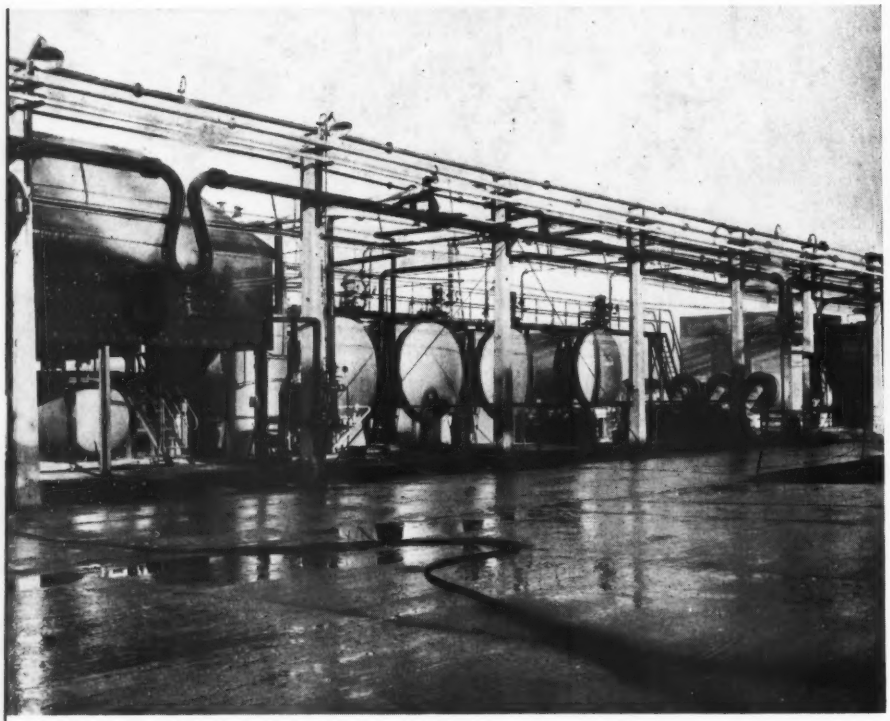
MATERIALS MANUFACTURERS

British Resin Products Ltd. and British Geon Ltd. are also included.

The display provides a glimpse into the future when the new Distrene Ltd. plant now being built at Barry, Glamorgan, comes into full production later in the year. In this factory, Distrene Ltd.—a company in which the Distillers Co., Ltd., are associated with the Dow Chemical Co.—will manufacture the various Styron materials, including Styron 475 and Styron 666. The products will be marketed by B.R.P., who are sole selling agents for the new company; they will be sold abroad under the trade name Distrene. Production quantities of Styron



Refrigeration plant at Aycliffe vinyl works of Bakelite Ltd.



Storage tanks at Barry plant of British Geon Ltd.

475 are already available from B.R.P. through arrangements made with the Dow Chemical Company.

Because of its good low-temperature properties, polystyrene is widely used in the refrigerator industry, and a special display of refrigerator mouldings is given prominence on the stand. Polystyrene sheet for use in this field is also featured. A collection of bright and colourful polystyrene toys is displayed, including many made with high-impact materials.

A section of the display is also devoted to a range of industrial mouldings.

Erinoid Ltd. **96**
Stroud, Gloucester.
Cellulose acetate, p.v.c. materials and casein. Extrusions in standard sections all to specification.

THE company is displaying a full range of plastics materials comprising casein in the form of rod, sheets and blanks. Also

MATERIALS MANUFACTURERS

shown are moulding powders in cellulose acetate, p.v.c. and polystyrene, and a small selection from a wide range of extrusions in p.v.c. (all grades), polythene and cellulose acetate butyrate. Items of particular interest are the polystyrene sheet, CP20 grade, for vacuum forming, a new range of dry colourants for polystyrene moulding powders and the new casein mother of pearl 4141.

The exhibits illustrate the many forms in which Erinoid products are available to manufacturers, such as sheets, rods, pipes and extrusions and moulding powders, together with examples of finished products made from Erinoid materials.

James Ferguson and Sons Ltd. **94**
Prince George's Road, London, S.W.19.
Phenolic and urea moulding materials and resins.

A RANGE of Nestorite phenolic and urea moulding materials is displayed. Synthetic resins for other applications are also demonstrated.

Fibreglass Ltd. **79**
Ravenhead, St. Helens, Lancs.
Plastics manufacturers.

ON display is the wide range of glass yarns and fabrics for the reinforcement of plastics. A few of the interesting new products in this new material are shown on this stand.

Geigy Co., Ltd. **67**
Rhodes, Middleton, Manchester.
Plasticizers, colours and other raw materials for the plastics industry.

THE stand is designed to show the work carried out by the company's laboratories concerned with research development and technical service of raw materials. By means of various illustrations, such as charts, graphs and colour test cards, recommendations are made to customers as to correct selection of raw materials for their particular application.

Glass Yarns and Deeside Fabrics Ltd. **71**
Craven House, 121 Kingsway, London, W.C.2.
Manufacturers of glass yarns and fabrics.

THE exhibit consists of Deeglass reinforced materials for the plastics industry. Special finishes are given to these materials, making them particularly suitable for specialized applications.

Grist Plastics Ltd. **9**
82 Brighton Road, Surbiton, Surrey.
Reprocessors.

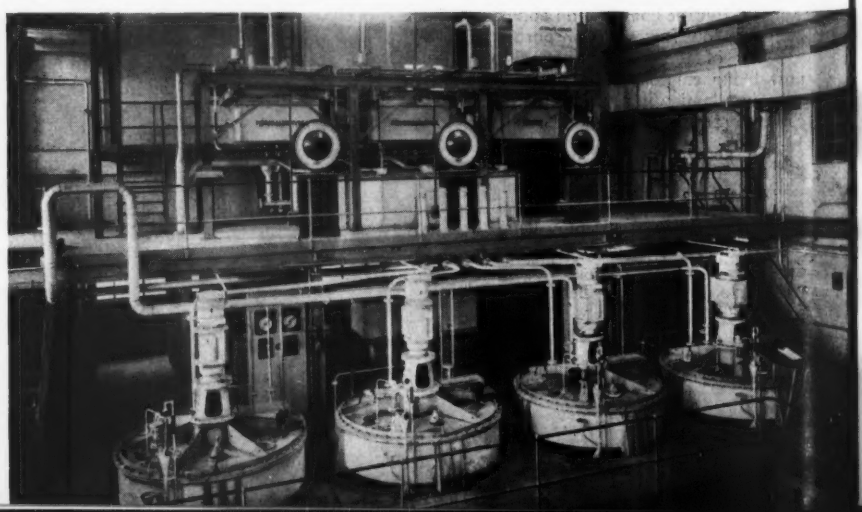
ON show is a range of reprocessed thermoplastic material, including polystyrene, cellulose acetate, polythene, p.v.c. and nylon.

E. R. Holloway Ltd. **50**
Bessemer Road, Welwyn Garden City, Herts.
Cellulose-acetate moulding and extrusion compounds.

EXAMPLES are shown on this stand of products fabricated from the Lustrac range of cellulose acetate thermoplastic compounds. These are used both for injection moulding and extrusion purposes.

Howards of Ilford Ltd. **69**
Ilford, Essex.
Chemicals for the plastics industry.

THE keynote on this stand is the range of "Cyclic" chemicals, for use as solvents, plasticizers, etc. These are used in a very wide range of applications.



Phenolic resin manufacture at the Wilton works of I.C.I. Ltd.

Imperial Chemical Industries Ltd. (Plastics Division) **80**
Black Fan Road, Welwyn Garden City, Herts.
Raw materials for the plastics industry.

THE I.C.I. Plastics Division stand emphasizes the use of I.C.I. plastics in the home. Domestic interiors, including a kitchen, nursery, bath-room and main living-room will show the many important home uses now being found for I.C.I. thermoplastics and thermosetting materials, special emphasis being placed on polythene and p.v.c. Acrylics and products from nylon and p.t.f.e., are also shown.

Kleestron Ltd. **76**
West Halkin Street, London, S.W.1.
Polystyrene moulding powder.

THE display features the polystyrene moulding powders, in various grades, manufactured by the company. These include Kleestron 604, a general-purpose grade in extruded pellet form produced in a wide variety of colours, including pearl finish.

Also shown are mouldings from the Kleestron D/S grade, anti-static, and Kleestron H, a high-impact grade.

Lacrinoid Products Ltd. **22**
Gidea Park, Essex.
Moulding powder manufacturers.

THE principal product, manufactured for export only, is a range of urea formaldehyde moulding powders. The Supertone grade is supplied in densified form and Supertone C has a special cellulose-acetate filler resulting in mouldings of high transparency and extreme lustre.

Lankro Chemicals Ltd. **89**
Salters Lane, Eccles, Manchester.
Plasticizer and stabilizer manufacturers.

THE main feature of the stand is the range of plasticizers manufactured by the company.

Monsanto Plastics Ltd. **68**
Victoria Station House, Victoria Street, London, S.W.1.
Polystyrene, plasticizers and raw materials for plastics.

ONE of the main features of this stand is the range of polystyrene moulding powders, including Lustrex Hi-Flow, a fast-flowing polystyrene for intricate mouldings needing a long flow, and Lustrex toughened 1.

Other exhibits include the Aroclors, a range of chlorinated diphenyls, plasticizers, including dimethyl phthalate, dibutyl phthalate, and diethyl phthalate, and for polyester resins, raw materials include phthalic anhydride and styrene monomer.

Pure Chemicals Ltd. **73**
Kirby Industrial Estate, Near Liverpool.
Manufacturers of stabilizers.

SPECIAL features on this stand are the Stanclere stabilizers based on organotin compounds, ferro stabilizers and epoxide-resin stabilizers, manufactured by Shell Chemicals, for which Pure Chemicals are British and European selling agents.

Scott Bader and Co., Ltd. **87**
Wollaston, Wellingborough, Northants.
Polyester laminating and casting resins.

CRYSTIC and Marco polyester resins are shown together with some examples of glass fibre reinforced plastics mouldings made with these resins. Scott Bader are now in their 10th year of polyester-resin production, and stages in the development of polyester resins during this period are illustrated. Corrugated translucent sheet, ships of over 50 ft. in length, bodies for motorcars and commercial vehicles, crash helmets, aircraft radomes, pipes and ducting, and many other types of low-pressure mouldings are now being made with Crystic and Marco polyester resins in this country.

MATERIALS MANUFACTURERS

Shell Chemicals Ltd. **83**
105-109 Strand, London, W.C.2.
Petroleum chemicals for the plastics industry.

THE main exhibits on this stand are the Epikote range of epoxy resins. Now in full production, they are used for laminating and casting in, among others, the aircraft, electrical and chemical industries. Samples of the resins and examples of the products in which they are being used are displayed.

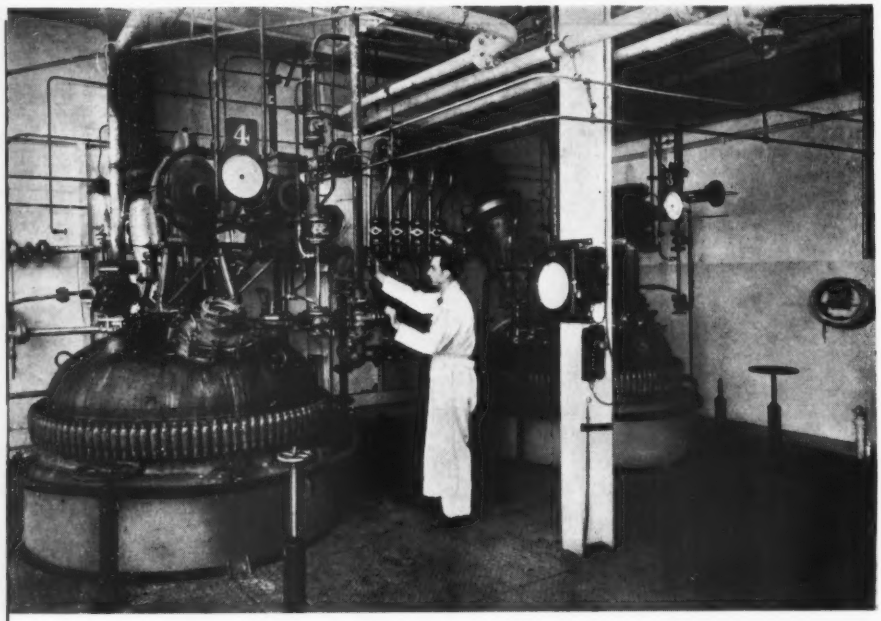
Among other products shown are di-allyl

MANUFACTURERS OF PLASTICS MATERIALS

The following table shows the various materials manufactured by exhibitors, and indicates the moulding and fabricating processes for which they are suitable by means of the key numbers below:

	Stand number	Phenolic	Urea	Melamine	Alkyd	Epoxy	Polyester	Cellulose acetate	Cellulose nitrate	Polyvinyl chloride	P.V.C. co-polymers	Polyvinyl acetate	Acrylic	Polystyrene	Polythene	Nylon	P.T.F.E.	Casein
B.I.P. Chemicals, Ltd.	66	—	1–3	1–3	—	—	2, 3	—	—	—	—	—	—	—	—	—	—	—
B.X. Plastics, Ltd.	78	—	—	—	—	—	—	4–7, 13, 15, 16	13, 16	4–7, 13, 15	6, 7, 13	—	15	4–7, 15, 16	16	—	—	13, 15
Bakelite, Ltd.	74	1–3	1–3	—	1	—	2	—	—	4–7, 11–13, 16	4–8, 11–13, 16	3	—	4	—	—	—	—
Birkbys, Ltd.	12	1–3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
British Geon, Ltd.	65	—	—	—	—	—	—	—	—	4, 5, 8–11	5	—	—	—	—	—	—	—
British Oxygen Co., Ltd.	88	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—
British Resin Products, Ltd.	65	1–3, 5	1–3	—	—	2	2, 3	4, 5	—	—	—	3	—	3	—	—	—	—
Catalin, Ltd.	61	2, 3	3	3	—	2	2, 3	—	—	—	—	—	—	—	—	—	—	—
Courtaulds, Ltd.	92	—	—	—	—	—	—	4, 16	—	—	—	—	—	—	—	—	—	—
Distrene, Ltd.	65	—	—	—	—	—	—	—	—	—	—	—	—	4, 5	—	—	—	—
Erinoid, Ltd.	96	—	—	—	—	—	—	4, 5	—	6, 7, 15	—	—	—	4–7	—	—	—	—
James Ferguson and Sons, Ltd.	94	1–3	1–3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E. R. Holloway, Ltd. (Lustrac, Ltd.)	50	—	—	—	—	—	—	4, 5	—	—	—	—	—	—	—	—	—	—
Imperial Chemical Industries, Ltd. (Plastics Division)	80	1–3	1–3	—	—	—	—	—	—	4–8, 10–12	4	—	4, 6, 7	—	4, 5, 12	4, 5, 12	5, 9	—
Kleestron, Ltd.	76	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—
Lacrinoid Products, Ltd.	22	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Monsanto Plastics, Ltd.	68	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—
Scott Bader and Co., Ltd.	87	—	—	—	—	—	2, 3	—	—	—	—	—	—	—	—	—	—	—
Shell Chemicals, Ltd.	83	—	—	—	—	2, 3	—	—	—	—	—	—	—	—	—	—	—	—
Styrene Products, Ltd.	96	—	—	—	—	—	—	—	—	—	—	—	—	4, 5	—	—	—	—
The Telegraph Construction and Maintenance Co., Ltd.	29	—	—	—	—	—	—	—	—	—	—	—	—	—	9, 15, 16	—	—	—
Tufnol, Ltd.	95	14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Utilex, Ltd.	96	—	—	—	—	—	—	16	—	—	—	—	—	—	—	—	—	—
Vinyl Products, Ltd., and Vinatex, Ltd.	91	—	—	—	—	—	—	—	—	3, 5, 8, 10, 11	3, 5, 8, 10, 11	3, 10	—	—	—	—	—	—

1. Compression moulding powders
2. Resins for reinforced plastics
3. Resins for adhesives
4. Injection moulding compounds
5. Extrusion compounds
6. Thermoplastic sheet for low pressure moulding
7. Thermoplastic sheet for vacuum forming
8. Thermoplastic dipping compounds
9. Sintering compounds
10. Thermoplastic spreading compounds
11. Thermoplastic calendering compounds
12. Thermoplastic blow-moulding compounds
13. Thermoplastic stock for blanking, machining, etc.
14. Thermoset laminated stock for machining
15. Thermoplastic rod for machining
16. Thermoplastic films and foils



Reaction room in polystyrene plant of Styrene Products Ltd.

phthalate, Alphanol 79 and Nonanol for plasticizers, solvents and chemical intermediates. For use in decorative finishes and adhesives for the plastics industry, a full range of Ketone solvents is shown.

Styrene Products Ltd. 96

96 Piccadilly, London, W.1.
Polystyrene moulding powders.

STYRENE PRODUCTS LTD. are again sharing the stand with Erinoid Ltd., who are marketing agents for this company, and also with Utilex Ltd., who are an associate firm fabricating acetate foils and sheet. Styrene Products are exhibiting their various grades of polystyrene, which now number six in all. They are as follows:

K.L.P. grade, which is a general purpose polystyrene suited to low-cost quality production.

2.C.L. grade, which is a high molecular weight, high-viscosity straight polystyrene, having an all-round strength of some 50% greater than general purpose polystyrene and which is particularly suited to the production of toilet brushes to avoid splitting during filling, and for mouldings with thin sections which may have to withstand flexing or shock.

H.S. grade, which is a heat-resistant polystyrene capable of withstanding 85° C. continuous temperature. It has a softening point of 100-103° C., measured by B.S.1493.

2.C.L./H.S. grade; this is a heat-resistant high molecular weight polystyrene, combining the properties of both 2.C.L. and H.S., and is particularly suited to the manufacture of monofilaments for brush manufacture.

C.P.20 grade is the new high-impact polystyrene copolymer, which should be noted not only for its impact strength but for high elongation and flexural strength. It can be moulded with a high-gloss finish, which is a property often lacking in high-impact polystyrenes. Its uses are infinite and vary from refrigerator components to radio cabinets, record player assemblies, toys, ball floats for water cisterns, etc.

C.P.20/H.S. has the same high-impact qualities as the previous grade, but is combined with a heat resistance which enables it to withstand higher temperatures. Some of its many uses are vacuum-flask cups, washing-up brushes, radio components, electric shaver bodies, canteen cups, etc.

These grades of polystyrene are not only suited to manipulation by the injection-moulding technique, but also by extrusion. Sheet from the high-impact types is admirably suited to the vacuum forming process.

MATERIALS MANUFACTURERS

Manufacturers of Plasticizers, Stabilisers, Colours and Pigments, Solvents, Powder fillers and Laminate fillers.

Exhibitor	Stand number	Plasticizers	Stabilizers	Colours and pigments	Solvents	Powder fillers	Laminate fillers
Boake, Roberts, A., and Co., Ltd.	72	×	×	×	×	—	—
Fibreglass, Ltd.	79	—	—	—	—	—	×
Geigy Co., The., Ltd.	67	×	—	×	—	—	—
Glass Yarns and Deeside Fabrics	71	—	—	—	—	—	×
Howards of Ilford, Ltd.	69	×	×	—	×	—	—
Imperial Chemical Industries, Ltd.	80	—	—	×	×	—	—
Lankro Chemicals, Ltd.	89	×	×	—	—	—	—
Monsanto Plastics, Ltd.	68	×	—	—	—	—	—
Pure Chemicals, Ltd.	73	×	—	—	—	—	—
Shell Chemicals, Ltd.	83	×	—	—	×	—	—
Turner Brothers Asbestos Co., Ltd.	84	—	—	—	—	—	×
Vavasseur, J. H., and Co., Ltd.	75	—	—	—	—	×	—
Wiggins Teape Group, The	81	—	—	—	—	—	×
Williams (Hounslow), Ltd.	86	—	—	×	—	—	—

Telegraph Construction and Maintenance Co., Ltd. 29

Telcon Works, Greenwich, London, S.E.10.
Polythene sintering compounds and polythene rod, film and foils.

PRODUCTS of the company are shown, including the polythene sintering materials widely used in the protective coating of metal and wire objects, and polythene film and sheet for use in packaging. In the latter case, the packaging field includes a wrapping medium for food, drum liners particularly suitable for the packing of materials which are affected by moisture, facing papers in cap liners, a moisture barrier and anti-scuffing medium in multi-wall paper sacks.

Turner Brothers Asbestos Co., Ltd. 84

Rochdale, Lancs.
Manufacturers of asbestos fibre and glass fibre reinforced plastics moulding materials.

EXAMPLES are shown of the applications by the company's glass-reinforcing materials, Duraglass, and the asbestos-reinforcing materials, Durestos.

Vinyl Products Ltd. and Vinatex Ltd. 91

Butter Hill, Carshalton, Surrey.
P.v.c., p.v.c. copolymers and polyvinyl acetate.

THE company, occupying a very important position in the emulsion industry, is showing examples of polyvinyl emulsions and polymer solutions. Polystyrene, polymethyl methacrylate, polybutyl methacrylate and other methacrylic esters are used. The company also manufactures, and will show, polyvinyl alcohol which can be supplied in solid form, polyvinyl acetate in bead form and polyvinyl butyral as a dried powder suitable for wash primers. The company also markets injection and extrusion compounds of the vinyl type.

William (Hounslow) Ltd. 86

Hanworth Road, Hounslow, Middlesex.
Manufacturers of colouring materials for plastics moulding powders.

A SPECIAL feature of this exhibit is the introduction by the company of colours suitable for the dry-colouring of the new high-impact polystyrene.

PLANT AND EQUIPMENT MANUFACTURERS

Asmidar Plastic Moulding Machines Ltd. **18**

5 Rampayne Street, London, S.W.1.

Manufacturers of injection moulding machines.

THE APM hand-operated bench injection moulding machine having a maximum capacity of some ¾ oz. (21 grams) is intended for both laboratory and industrial work. It may be used with all thermoplastic moulding materials including nylon, and production rates of up to 100 shots per hour can be obtained with some types of moulds. The electrical heating system of the machine may be connected to any standard lighting voltage supply.

B.I.P. Engineering Ltd. **41**

Streetly Works, Sutton Coldfield.

Hydraulic moulding presses and pelleting machines.

ON this company's stand in addition to two versions of the standard Bipel hydraulic pelleting machine, there is now exhibited a multi-hydraulic pelleter which is designed to produce pellets at the rate of a rotary machine, but at the same time having a lower initial cost. This machine operates on the same principle as the original pelleters, but is built specifically for the smaller size of pellets. By fitting a multi-impression head, the output has been raised to approximately 20,000 pellets per hour. The Bipel low-pressure press, which was among the first to be produced in this country for the new polyester epoxy resins reinforced with glass fibre, has had certain modifications incorporated, since it was first shown to the public at the 1953 British Industries Fair, to meet the exacting requirements of this work. There is also a 150-ton automatic press which includes all the standard Bipel features, but has increased daylight and width.

One other new machine which Bipel are now offering is a 20-ton auto-control press especially designed for use with alkyd materials, and it is therefore built to have an extremely fast closing and opening speed whilst retaining many of the virtues of the other Bipel presses, including a controlled speed of final slow close.

B.I.P. Tools Ltd. **41**

147 Tyburn Road, Erdington, Birmingham.

Tool makers for plastics mouldings.

A MEMBER of the B.I.P. Group, B.I.P. Tools maintain extensive tool rooms in Birmingham. With the aid of technical staff specializing in advice on mould design, the company manufactures moulding tools of every kind.

Bone Brothers Ltd. **58**

Manor Farm Road, Alperton, Wembley, Middlesex.

Manufacturers of moulds and dies and extrusion machines.

THE main features of the Bone Bros. Ltd., display are the extruders which they are now building under licence from Frank W. Egan and Company, Bound Brook, New Jersey, U.S.A. The company have built a number of machines for the coating and laminating of paper, of which the extruder is a separate unit. The extruders displayed are completely built in Bone Brothers engineering works at Wembley. The development of the extruder for purposes other than paper coating was a logical outcome, and Bone Brothers are now offering these extruders for the various plastics on the market.

Two features are the patent vapour cooling system and the planetary gear compounding head. Dies for paper coating, lay-flat tubing, flat film, wire covering and piping are exhibited and the company also supplies haul-off gear of varying types.

Bradley and Turton Ltd. **54**

Caldwell Works, Kidderminster.

Manufacturers of plastic moulding equipment, hydraulic presses, pumps, accumulators, pelleting presses and hydraulic metal drawing presses.

ON display this year is a new self-contained 150-ton universal compression and transfer moulding press. Apart from the loading of powder into the dies and the removal of the finished mouldings, this press is completely automatic in operation. Many new and interesting features are embodied in the design, and particularly important is the ease with which any particular cycle can be recorded and repeated again at a later date.

The press has been designed for high-speed operation with the latest fast-curing materials, and its universal coverage of all conditions of compression and transfer moulding should make it a valuable addition to any moulding plant. Also shown is a No. 336 120-ton semi-automatic press of

Automatic fast-cycling machine manufactured by Dowding and Doll Ltd.

standard construction, and a No. 202 50-ton upstroking hydraulic press fitted with electric heated platens, both machines being suitable for operating from individual pump units or an accumulator supply.

British Ermeto Corporation Ltd. **36**
Beacon Works, Hargrave Road, Maidenhead, Berks.
Makers of ancillary equipment of the plastics industry.

THE Ermeto pipe coupling is patented throughout the world, and is capable of withstanding the highest industrial pressures even under conditions of extreme vibration.

PLANT AND EQUIPMENT MANUFACTURERS

It is widely used on hydraulic presses and many other hydraulically operated machines, and is available in a variety of fittings for steel, stainless steel, aluminium and brass tubes.

Collinsons' Precision Screw Co., Ltd. **35**
Forest Road, Walthamstow, London, E.17.
Metal threads, screws, moulding inserts, turned metal parts.

CONSIDERABLE work has been done by this company in collaboration with the plastics moulding industry to achieve standardization of moulding inserts, and the variety and capacity of production available are the principal features of the stand.

T. H. and J. Daniels Ltd. **20**
Lightpill Iron Works, Stroud, Gloucester.
Manufacturers and merchants for hydraulic presses, plastics moulding plant, high-speed pumps, extruders and ancillary equipment.

THE main feature of this company's stand is the 250-ton low-pressure moulding press for glass fibre moulding. This is the largest of the range of presses for this purpose at present produced, having tables 8 ft. by 5 ft. drilled with water-cooling passages. Two speeds of closing are provided, allowing for high-speed approach and controlled speed of mould closing, the latter speed being controlled down to zero.

The machine has a stroke of 4 ft. and a maximum daylight between tables of 7 ft.

In addition, a new design of 200-ton compression or transfer moulding press is exhibited, complete with automatic process controller, and full ancillary equipment, including guards, hanging bar ejector, speed control valve and delay valve, to give automatic control over a complex moulding cycle.

Other items of the company's productions are shown.

Dowding and Doll Ltd. **21**
346 Kensington High Street, London, W.14.
Manufacturers of injection-moulding machines.

FOUR machines are shown, each operating for demonstration purposes. Two Dowding Series II fully automatic fast-cycling injection-moulding machines are included, and interesting examples of the type of mouldings which can be produced, fully automatically, at exceptionally high rates of production. These machines are capable of moulding a wide range of thermoplastic materials and reduce moulding costs very considerably for the production of components up to 1-oz. weight capacity.

The Westminster hand- and power-operated injection-moulding machines which are also on exhibition effectively provide trouble-free production of small mouldings up to $\frac{1}{2}$ oz. capacity in the case of the power machine and $\frac{1}{4}$ oz. in the case of the hand machine, thereby fulfilling a wide demand for this small type of equipment. The power-operated machine is fitted with a self-contained hydraulic unit and is now being used quite extensively for nylon mouldings.

W. Edwards and Co. (London), Ltd. **17**
Manor Royal, Crawley, Sussex.
Manufacturers of vacuum coating and vacuum forming equipment.

A VACUUM forming machine, model 2G5 is shown, developed by Hydro-Chemie Ltd., Switzerland, and now being manufactured under licence by Edwards. It is a twin-table, automatic machine with a maximum effective moulding area of 40 in. by 60 in., the maximum depth of draw being 22 in. Ready for use on normal electrical, water and compressed-air supplies.

A model 36E vacuum coating unit has a 36-in. diameter horizontal vacuum chamber 36-in. long, with double doors arranged for quantity coating of plastics articles. The unit is completely self-contained and can be operated by semi-skilled labour; all handling difficulties are eliminated and the coating is deposited in one cycle. A model 24CE coating unit shown is specially designed for the deposition of thin films of zinc on paper or nylon rolls up to 6 in. spool diameter and 5 in. wide.

Foster, Yates and Thom Ltd. **40**
Blackburn, Lancs.
Heavy precision engineers, manufacturers of hydraulic moulding presses and boilers.

IN the press field, three machines are shown, the first a 150/40-ton compression/transfer moulding press. In addition, a 1,000-ton multi-daylight hot-platen press for manufacturing chipboard, plywood, laminated plastics and veneering is shown operating. Also working on the stand is a six-unit moulding press, the most recent addition to the comprehensive range of Lancastrian presses manufactured by Foster, Yates and Thom Ltd. This machine has been specially designed for the moulding of quick-curing alkyd moulding compounds. Each unit is fitted with a complete set of controls and can be operated individually if required.

Two examples of mixing machines are shown, the first a laboratory model of a Rotocube dry-powder mixing machine. The second is a number 2 size demonstration model.

The boiler manufacturing section of the company's activities is demonstrated by two models, the first of a 30 ft. by 9 ft. Lancashire boiler complete with its brick-work setting, and the second a self-contained type economic boiler 9 ft. 9 in. by 15 ft. 6 in. long over the tube plates, complete with fittings and mountings.

General Electric Co., Ltd. **13**
Magnet House, Kingsway, London, W.C.2.
Manufacturers of infra-red and high-frequency heating equipment.

BOTH infra-red and high-frequency heating equipment is shown on the G.E.C. stand. The display includes a 2 kW. high-frequency generator for setting synthetic resin glues; this is suitable for use in the furniture industry and it also finds wide application in the moulding industry for the dielectric preheating of thermosetting materials prior to moulding. Another preheater shown on this stand is the G.E.C. standard bench-type oven, in which resistance elements provide radiant heating.

Other equipment shown by the G.E.C. includes a special Osram infra-red lamp

plant for softening thermoplastics sheets before shaping by pressing or blowing them; this type of plant is also used for curing synthetic resin finishes and similar applications.

A feature of the heating display is a new infra-red heating panel, 3 ft. long and 6 ft. wide, which contains sheathed wire elements arranged with their length at an angle to the direction of flow of the material so that there can be no "streaking." Behind the elements is a reflecting surface of aluminium which directs the radiation and the panel is designed in such a way that the effective heating width can be varied to suit different widths of material. This equipment is used for such processes as gelling p.v.c. pastes; a small-scale demonstration of this application takes place on the stand.

The Granbull Tool Co., Ltd. **37**
39 High Street, Kingston-on-Thames, Surrey.
Manufacturers of moulds, blow-moulding equipment, jigs, fixtures and press tools.

DISPLAYED on the stand is a wide range of articles produced on the blowing equipment made by this company. The selection illustrates the flexibility of the process which is of value to manufacturers of toys and utility articles in addition to its more obvious application in the production of plastic bottles.

The blowing equipment offered is designed for use with a standard injection-moulding machine and allows moulders to enter this field without the heavy capital outlay normally associated with this type of work.

The company also manufactures conventional moulds for both compression and injection, and a typical example of this class of work is shown on the stand.

Alfred Herbert Ltd. **20**
Coventry, Warwickshire.
Manufacturers of machines, and machine tools and equipment.

IN association with T. H. and J. Daniels Ltd., of Stroud, this company is exhibiting a selection of machines and equipment from the comprehensive range available for plastics moulding. Two injection-moulding machines are shown, the first a Herbert Reed-Prentice 16-20-oz. injection-moulding machine with double shot. Built in this country under licence, the machine is self-contained and hydraulically operated with push-button control, providing manual, semi-automatic or fully automatic operation. A low-pressure die closing device for die-protection when on automatic cycle and a special nozzle for moulding nylon can be fitted to this machine. The die locking pressure is 400 tons, maximum casting area 200 sq. in., plasticizing capacity per hour 125 lb., and the size of die plates 38 in. by 36 in.

The second injection-moulding machine is the Edgwick HY unit. Self-contained, fully automatic, and equipped for manual and fully automatic operation, the machine has a heating cylinder specially designed for rapid, even heating of the material, the heat being provided by external circular heaters.

The company is also showing the Pulsometer vacuum forming machine, available either with single or twin platens.

In the compression moulding field, a 250-ton low-pressure moulding press for glass fabric reinforced materials is shown manufactured by T. H. and J. Daniels Ltd. This machine has a stroke of 4 ft. and a maximum daylight between tables of 7 ft. Two speeds of operation are provided, a fast approach and a controlled speed for final closing.

The Daniels 200-ton transfer moulding press is of the semi-automatic type having 30-in.-square electric platens, Daniels automatic process timer and full auxiliary equipment including guards, hanging-bar ejector, speed-control valve and delay valve.

London and Scandinavian Metallurgical Co., Ltd. **57**
Gonsalva Road, London, S.W.8.
Manufacturers of moulds and dies for the plastics industry.

THE tool department of this company operates as a separate unit, having a modern toolroom fully equipped for the production of all types of moulds and dies used in the plastics industry.

The main speciality of this section of the company is the manufacture of hard nickel electro-formed mould dies, and complete moulds incorporating these cavities of which they, with their licensees in the United States, France and Spain, are the world's sole producers. By the use of this method of manufacture, it is possible to effect a large saving in tool costs on intricate dies such as for nylon gears, particularly helical and worm types, reflectors, business machine key tops, decorative "three-dimensional" mouldings, and other intricate injection mouldings of a technical or artistic nature, and even gauges for spline shafts, where the close tolerances possible by electro-forming are used to advantage.

An interesting and highly specialized aspect of this company's activities utilizing the electro-forming process is the manufacture of moulds for making acrylic teeth where, in addition, the complete equipment is also supplied for this industry. Another use based on electro-forming is the manufacture of shells for the slush casting of p.v.c., the only satisfactory method where flash lines are not desirable.

On the stand, visitors see numerous sample cavities, some of remarkable intricacy. Also exhibited are sample mouldings produced by their many customers, including leading firms in the plastics industry.

Maniplastics Ltd. **1**
Mortgramit Square, Hare Street, London, S.E.18.
Manufacturers of moulds and dies, extrusion machines and haul-off equipment.

THE main products of the company, the range of extrusion machines is shown, together with examples of haul-off equipment designed for the extrusion of a wide range of thermoplastic compounds.

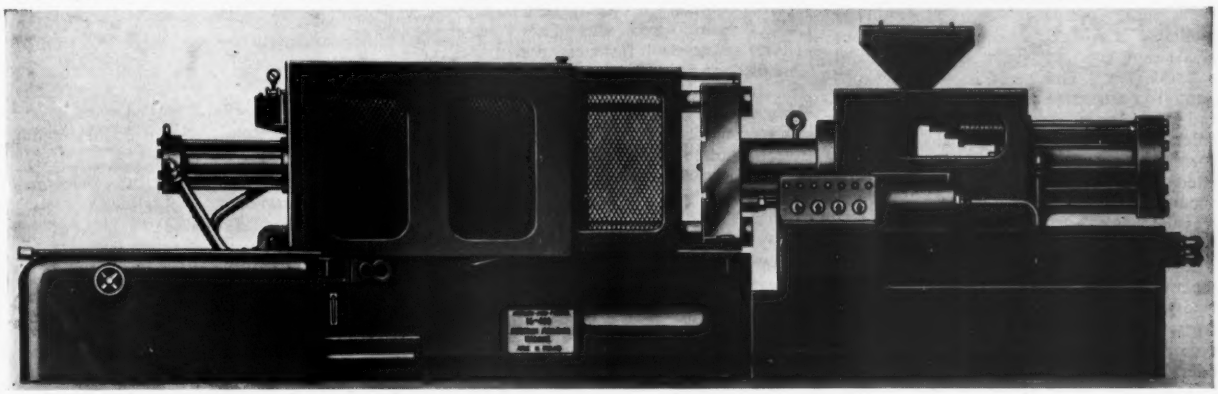
Peco Machinery Sales (Westminster), Ltd. **7**
28 Victoria Street, London, S.W.1.
Manufacturers of injection-moulding machines, extruders, vacuum forming machines, material hopper dryers, mould-temperature controllers, moulding accessories and extrusion take-off equipment.

A COMPLETE range of injection-moulding machines is manufactured, in capacity from 1½ oz. to 120 oz. Many models are exhibited and each will be engaged on a production moulding run throughout the period of the exhibition.

PLANT AND EQUIPMENT MANUFACTURERS

The latest developments in machinery and equipment for fully automatic moulding are displayed. The new Peco In-Line pre-plasticizer is also being demonstrated, this machine being representative of the latest advance in injection-moulding machine design.

Herbert Reed-Prentice 16/20-oz. injection-moulding machine.



Two extrusion machines are displayed. The 4½-in. unit which is the latest Peco development in extrusion machinery, is set up to produce polythene piping and is running for several hours each day. A 2½-in. machine is also exhibited together with a number of different extrusion screws which have been developed specifically for economic production of extrusions using the complete range of thermoplastic materials.

A complete range of the ancillary equipment is available for use with injection-moulding and extrusion machines. This range includes mould-temperature controllers, hopper material dryers and a new development, the Peco Packomatic compensator, the latter unit having been recently introduced to provide control over mould packing and internal stress in injection mouldings. The extrusion standard take-off equipment is available together with standard dies for the production of pipe and film.

Plastools (London) Ltd. **19**

Cray Road, Sidcup, Kent.

Manufacturers of moulds and dies for the plastics industry.

THE company is showing two moulds which have seen considerable service in the past year, as examples of the high level reached in tool manufacturing. Also shown is a large variety of articles produced from those manufactured by the company. Plastools specialize particularly in the manufacture of tools for the comb trade.

Radio Heaters Ltd. **2**

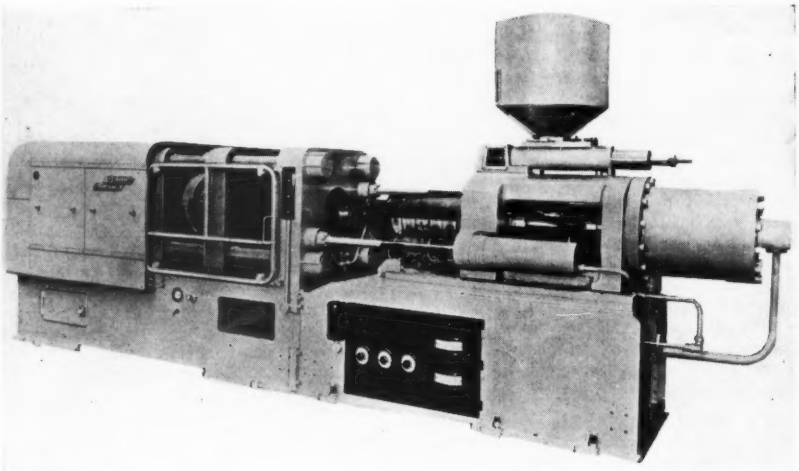
Eastheath Avenue, Wokingham, Berks.

Manufacturers of industrial electronic heating equipment.

A NUMBER of thermoplastic sheet welders are on display from the extremely extensive Radyne range. A team of welders is shown performing various operations in the actual production of plastic raincoats. New welders shown for the first time are Radyne models W.12 and W.21. These have power outputs respectively of 1½ kW. and 3 kW. at approximately 37 mc/s. They are table-type welders with a separate oscillator and press. The oscillator is situated under the table, thus giving ample clear space for laying out patterns, etc. The press itself is of substantial construction with generous daylight and provision for fitting top electrodes of differing total thickness. The press is normally foot-pedal operated but can be fitted with a combined foot-pedal and pneumatic booster arrangement for greater pressure when necessary.

Radyne model W.2 portable ¼-kW. welder is also on view. This is a high-grade generator to which can be connected various types of hand tools and small table-type presses by means of flexible co-axial leads. This machine has already proved of considerable value in the packaging industry.

PLANT AND EQUIPMENT MANUFACTURERS



Peco 50 oz. injection moulding machine.

Redifon Ltd. **59**

Broomhill Road, London, S.W.18.

Manufacturers of welding equipment.

THIS company is introducing a completely new range of plastics welding machines, including the J.P.10, a large press welder capable of dealing with very long, straight welds in a single operation. Also included is the J.P.9 "Tong" welder, in which the electrodes are portable and connected to the generator by cable, and the J.P.7 a larger version of the popular model J.P.1, giving a considerably increased weld area.

Outstanding is the J.P.10 press welder which sets a new standard of mechanical simplicity and construction in equipment of this type. It is powered by a separate 2 kW. R.F. generator, type R.H.36, operating at a high frequency. This combination enables over 8 sq. in. of weld area to be achieved on normal materials and more important, a single, straight-line weld of over 4 ft. in length is possible, and contours 6 ft. or longer can be readily tackled. The press can also be supplied with a sliding table for mass-production work. This machine will enable many problems in the welding field to be solved, particularly in the manufacture of large articles such as inflatable mattresses, beach toys, long seams in plastic upholstery and complete seams in waterproof clothing.

Simmonds Aerocessories Ltd. **56**

Treforest, Glamorgan.

Manufacturers of specialized aeronautical and engineering accessories.

THIS company is displaying a large range of Spire speed nuts, fixes and clips. These spring-steel fasteners are made for threaded and unthreaded members and are resilient, self-locking and vibration proof. They simplify the design and production of many moulded articles. A representative selection of components is on show typifying usages in various branches of the plastics industry, including toys and radio.

Universal Tools Ltd. **16**

Tramway Path, Mitcham, Surrey.

Manufacturers of press tools, moulds and jigs.

THIS company, who are manufacturers of all types of moulds for plastics, are exhibiting typical examples of their workmanship and products from their tools, illustrative of the high standard in design and construction achieved.

Also shown, are photographs of the very modern plant including one of the latest type Keller die-sinking machines which this company possesses, and on the stand of the Projectile and Engineering Co., Ltd., an injection mould by Universal Tools Ltd., can be seen in operation.

Vacuum Industrial Applications Ltd. **39**

High vacuum coating plant manufacturers.

SINCE the 1953 exhibition Vacuum Industrial Applications Ltd., have made continued developments. One of the units shown is the twin-tank, unit-type machine type E2H36. Consisting of two 36-in. tanks operating alternately on one common pumping system to give continuous operation with minimum maintenance This has been made possible by the development of an arrangement which uses new clamping devices between the flanges on the high vacuum system combined with simple valve operation from the main control panel by the use of electrically-operated actuators.

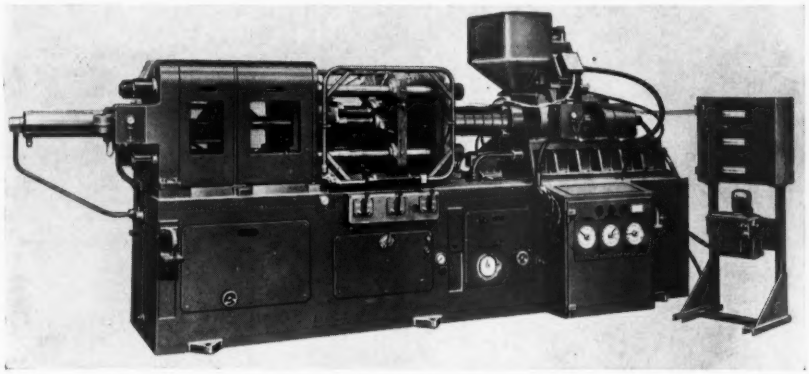
A large-capacity plant having a tank 5 ft., type No. EH60 features a powerful pumping system which provides, on the empty tank, a pumping down time of 4½ min. to 0.5 microns. The door movement is on its own plane and does not require any additional floor space. Both are designed for operation either manually or by automatic control equipment to production requirements.

R. H. Windsor Ltd. **34**

Leatherhead Road, South Chessington, Surrey.

Injection moulding and extrusion machinery manufacturers.

THIS stand, one of the biggest in the exhibition, features five main aspects of the company's products. The first, the Windsor SH1 injection-moulding machine, is the smallest of a wide range of machines, the press having a locking load of 30 tons and exerts pressure of 20,000 lb. per sq. in. on the material. The maximum area



R. H. Windsor pre-plasticizing unit in the 8/10 oz. machine.

moulded is between 10 to 12 sq. in., and the hydraulic power is supplied by a Vickers V-139-U.S7 double pump, driven by a 10 h.p. motor. The control gear for operating the machine on the automatic and semi-automatic cycle is completely mechanized.

The Windsor S.H.4, fully automatic, injection-moulding machine, capable of producing articles weighing up to 4 oz. of material, has a locking force of 150 tons and an injection plunger pressure of 17,000 lb. per sq. in. The maximum area moulded is 40 sq. in. The 15 h.p motor and the hydraulic pump are mounted on a cradle which slides as a complete unit into the end of the base.

An improved pre-plasticizing unit has been incorporated into the Windsor S.H.8/10 injection-moulding machine, enabling it to mould 32 oz. of cellulose acetate, whereas the previous capacity of the machine was 10-12 oz. Plasticizing capacity of 60 lb. has been raised to 140 per hour.

The Windsor twin-screw extruder, type R.C.65 driven by a 5 h.p. A.C. commutator variable-speed motor, has a splined screw design permitting easy removal of the working section of the extruding screws. A new type flange barrel mounting eliminates tie rods and a hinged adaptor plate facilitates set-up and take-down time. Both these developments make cleaning and adjustments much easier.

The Windsor R.C.100 twin-screw extruder is shown in conjunction with the rigid-tube take-off equipment. This machine is driven by a 10 h.p. A.C. commutator variable-speed motor, capable of extruding 100 lb. plus of thermoplastics material per hour. This machine is particularly suitable for the manufacture of rigid tubing, such as completely unplasticized p.v.c. The Windsor complete extrusion take-off equipment for the production of rigid tube consists of the extruder, die, tube cooling tank and tube cutting unit. The die is of simple design. Immediately in front of the die face is a water-cooled former box. The tube cooling consists of a trough divided into four separate compartments, each with a rubber entry seal to suit the size of the tube to be extruded. Cooling can be obtained either by total immersion or by direct jet cooling.

Winkworth Machinery Ltd. **38**

65 High Street, Staines, Middlesex.

Chemical plant engineers.

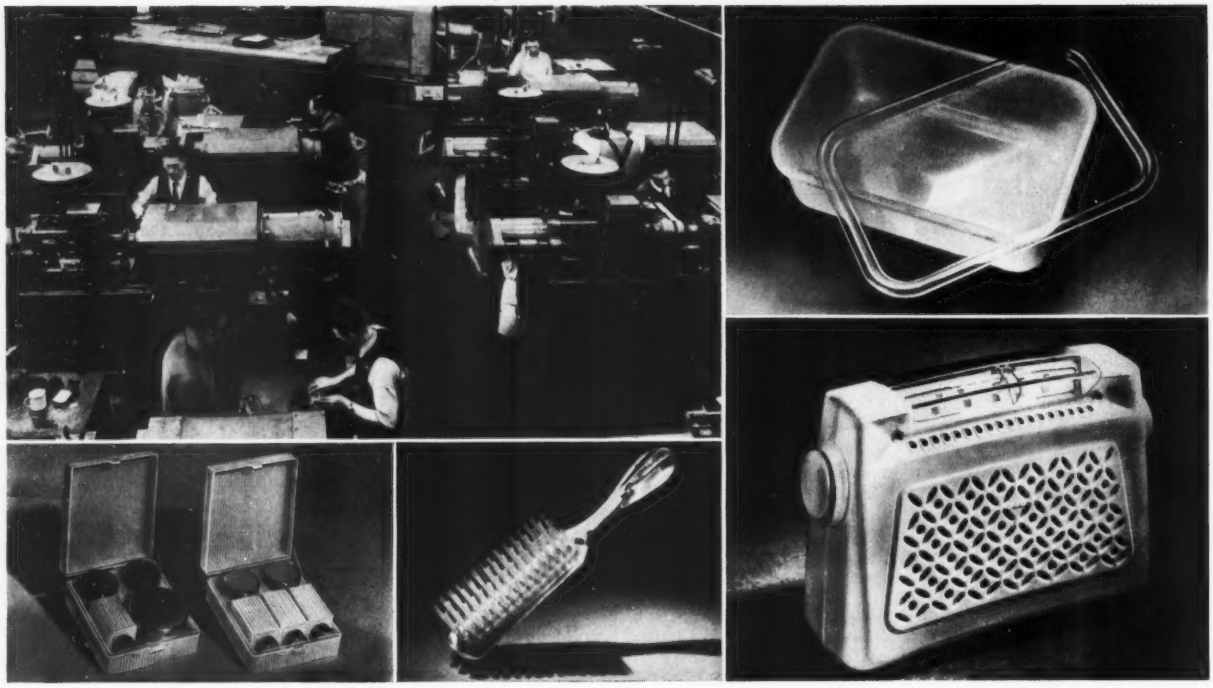
THIS company is showing mixing machines, incorporators and blenders, of their manufacture, in a range of sizes for research, pilot plant and production.

Their chief exhibits include a special heavy-duty jacketed incorporator with hydraulic tilting, a horizontal "U" trough blender for many applications in the plastics industry, including the pre-mixing of resins and plasticizer in the production of translucent p.v.c. sheeting; a double-paddle mixer for use in the production of p.v.c. pastes and a change-can planetary mixer.

PLANT AND EQUIPMENT MANUFACTURERS

PLANT AND EQUIPMENT MANUFACTURED OR SUPPLIED BY EXHIBITORS

Exhibitor	Stand number	EQUIPMENT MANUFACTURED OR SUPPLIED: Compression moulding presses	Low-pressure moulding presses	Injection-moulding presses	Moulds	Pelleting and pre-forming machines	Moulding accessories	Pre-heating equipment	Hydraulic equipment	Extrusion machines	Welding equipment	Mixing machinery	Lathes and other toolroom equipment	Vacuum-coating plant	Vacuum-forming machines
Asmidar Plastic Moulding Machines, Ltd.	18	—	—	X	—	—	—	—	—	—	—	—	—	—	—
B.I.P. Engineering, Ltd.	41	X	X	—	—	X	—	—	—	—	—	—	—	—	—
B.I.P. Tools, Ltd.	55	—	—	—	X	—	—	—	—	—	—	—	—	—	—
Bone Brothers, Ltd.	58	—	—	—	X	—	—	—	—	X	—	—	—	—	—
Bradley and Turton, Ltd.	54	X	X	—	—	X	—	—	X	—	—	—	—	—	—
British Ermeto Corporation, Ltd.	36	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Collinson's Precision Screw Co., Ltd.	35	—	—	—	—	—	X	—	—	—	—	—	—	—	—
Daniels, T. H. and J., Ltd.	20	X	X	X	—	X	—	—	—	X	—	—	—	—	—
Dowding and Doll, Ltd.	21	—	—	X	—	—	—	—	—	—	—	—	—	—	—
Edwards, W., and Co. (London), Ltd.	17	—	—	—	—	—	—	—	—	—	—	—	—	X	X
Foster, Yates and Thom, Ltd.	40	X	—	—	—	X	—	—	X	—	—	X	—	—	—
General Electric Co., Ltd.	13	—	—	—	—	—	—	X	—	—	—	—	—	—	—
Granbull Tool Co., Ltd.	37	—	—	—	X	—	—	—	—	—	—	—	—	—	—
Herbert, Alfred, Ltd.	20	X	X	X	X	X	X	—	X	X	—	—	X	—	X
London and Scandinavian Metallurgical Co., Ltd.	57	—	—	—	X	—	—	—	—	—	—	—	—	—	—
Maniplastics, Ltd.	1	—	—	—	X	—	—	—	—	X	—	—	—	—	—
Plastools (London), Ltd.	19	—	—	—	X	—	—	—	—	—	—	—	—	—	—
Projectile and Engineering Co., Ltd.	14	—	—	X	—	—	X	—	—	X	—	—	—	—	—
Radio Heaters, Ltd.	2	—	—	—	—	—	—	X	—	—	X	—	—	—	—
Redifon, Ltd.	59	—	—	—	—	—	—	X	—	—	X	—	—	—	—
Simmonds Aerocessories, Ltd.	56	—	—	—	—	—	X	—	—	—	—	—	—	—	—
Universal Tools, Ltd.	16	—	—	—	X	—	—	—	—	—	—	—	—	—	—
Vacuum Industrial Applications, Ltd.	39	—	—	—	—	—	—	—	—	—	—	—	—	X	—
Windsor, R. H., Ltd.	34	—	—	X	X	—	—	—	—	X	—	—	—	—	—
Winkworth Machinery, Ltd.	38	—	—	—	—	—	—	—	—	—	—	X	—	—	—



MOULDERS AND FABRICATORS

Ashdowns Ltd. **31**

Eccleston Works, Knowsley Road, St. Helens, Lancashire.

Manufacturers of mouldings, extrusions, laminates and other reinforced materials.

THE main products of this company are demonstrated by units on the stand which include mouldings in thermosetting and thermoplastic materials, extrusions in thermoplastics, Ashlam S.R.B. paper mouldings for refrigerators and other applications, Ashlam S.R.B. boards for electrical insulation and mechanical applications and formed and fabricated parts from thermoplastic sheet.

An important feature of the company's work lies in the field of reinforced plastics and examples are shown of laminates incorporating silicone, melamine, phenolic, polyester and epoxy resins. Glass fibre reinforced tubes and bobbins and various glass fibre reinforced mouldings are on display, and examples of metal-clad laminates.

Birkbys Ltd. **12**

Liversedge, Yorkshire.

Moulders of thermosetting and thermoplastic materials.

THE display includes a wide selection of technical compression and transfer mouldings made from Elo moulding powders and moulded in tools made by Birkbys. Also shown are mouldings in thermoplastic materials by the injection process for a wide variety of applications.

Barclay-Stuart (Plastics) Ltd. **63**

25-27 Brunswick Street, Luton, Bedfordshire.

Compression and transfer moulders, extruders, injection moulders, blow moulders, electronic welders, tool makers and manufacturers of monofilaments.

THE stand demonstrates the seven phases of the company's activities given above. To show products from compression and transfer moulding, motorcar parts, furniture, electrical, radio and television components are displayed. Injection mouldings include radio and motorcar components, electrical mouldings and toys, from polystyrene, cellulose acetate, acrylic and p.v.c. compounds. Extrusions are demonstrated by many sections, in p.v.c., polythene, and polystyrene and blow mouldings are illustrated by bottles and dolls' heads. Numerous examples of high-frequency welding include wallets, note-cases, children's bags and various other fancy goods. The monofilament is shown to demonstrate its suitability for brush manufacture.

Barrett and Elers Ltd. **45**

Dace Road, Old Ford, London, E.3.

Compression and Transfer Moulders.

THE company has considerable experience to draw upon. The exhibits on the stand demonstrate the widely varying kinds of moulding carried out, and include meter cases, moulded base doors and insulating bushings.

Although specializing in mouldings for the electrical industry, the company covers a variety of other trades, including bottle caps, and handles for the hardware industry.

Canadian Government Exhibit. **48**

Commercial Division, Office of the High Commissioner for Canada, Canada House, Trafalgar Square, London, S.W.1.

TWO Canadian companies are showing examples of industrial and decorative laminates, the Arborite Co., Ltd., and the St. Regis Paper Co. (Canada) Ltd. Vinyl films and coated fabrics are being shown by Shirlite Products of Canada.

Cascelloid, Division of the British Xylonite Co., Ltd. **26**

Abbey Lane, Leicester.

Moulders, Extruders and Fabricators.

A SPECIAL feature of this stand is devoted to industrial packaging, employing nylon, p.v.c., and cellulose acetate. Also included in this section are containers in polythene having from one pint to 10 gallons capacity. Cascalite corrugated roofing in glass-reinforced polyester is shown and has been used in the construction of the stand.

Cellgrave Co., Ltd. **44**

Crown Works, Godman Road, London, S.E.15.

Fabricators of thermoplastic materials.

THE stand is illustrated with examples of fabrications from a wide range of thermoplastic materials. The processes employed includes sheet forming, machining, welding and cementing, marking and printing and embossing and stamping.

Chemidus Plastics Ltd. **64**
89 Upper Thames Street, London, E.C.4.
Extruders.

BASED on a new unplasticized p.v.c. compound, the company is showing a wide range of tubes and rods, both in the material's natural colour and in a range of colours.

E. K. Cole Ltd. **30**
Ekco Works, Southend, Essex.
Custom and proprietary moulders and fabricators.

AS one of the leading moulding organizations, the company is showing a wide variety of products from both compression moulding, transfer moulding and injection moulding. Of special interest in the thermosetting field are various electrical mouldings for the trade; in the thermoplastic field products range from industrial components to the branded products of the company.

Crystalate Ltd. **52**
Mill Lane, Tonbridge, Kent.
Compression, transfer and injection moulders and fabricators.

THE exhibit is of trade mouldings by Crystalate, Ltd., Ebonestos Industries, Ltd., and Mica Products, Ltd. The companies, although associated in the Crystalate Group, trade independently of each other but for convenience their products are shown together at this exhibition.

The samples include components of high-precision compression and transfer mouldings of the thermosetting group produced by Crystalate, Ltd., and Ebonestos Industries, Ltd., in phenolic and urea materials.

Crystalate, Ltd., have developed their own shellac base compounds for certain applications and Ebonestos Industries, Ltd., manufacture special bituminous compositions.

Mica Products, Ltd., concentrate primarily on the injection moulding of materials in the thermoplastic group such as polystyrene, cellulose, acetate, nylon, polythene, and

MOULDING AND FABRICATING PROCESSES EMPLOYED BY EXHIBITORS

This table shows the various moulding and fabricating facilities offered by exhibitors; in addition, with the aid of the key numbers below, the materials regularly employed in these processes can be seen.

Exhibitor	Stand number	Moulding and Fabricating Processes Employed													
		Compression moulding	Transfer moulding	Injection moulding	Extruding	Laminating	Calendering	Spreading	Dipping	Sintering	Sheet forming	Machining	Welding and/or cementing	Marking, printing	Embossing, stamping
Ashdowns, Ltd.	31	1–4	1	5–10, 12	8	1, 3, 4	—	—	—	—	5, 8, 9, 11	1–12	—	—	—
Barclay Stuart (Plastics), Ltd.	63	1–3	1, 2	5–12	5–8, 10	—	—	—	—	—	—	—	8	—	—
Barrett and Elers, Ltd.	45	1, 2	—	—	—	—	—	—	—	—	—	—	—	—	—
Birkbys, Ltd.	12	1–3	1, 3	5–10, 12	—	—	—	—	—	—	—	—	—	—	—
Cascelloid, Ltd.	26	—	—	5–12	5, 6, 8, 10	4	—	—	—	—	5, 7, 8–10	5–12	5–9	5–12	5–12
Cellgrave Co., Ltd.	44	—	—	—	—	—	—	—	—	—	5, 6, 8, 9, 11	5, 6, 8, 9, 11	5, 6, 8, 9, 11	5, 6, 8, 9, 11	5, 6, 8, 9, 11
Chemidus Plastics, Ltd.	64	—	—	—	8	—	—	—	—	—	—	—	—	—	—
E. K. Cole, Ltd.	30	1–4	1–3	5–12	7, 8, 10	—	—	—	—	—	7–9	—	1–3, 5–7, 9–11	1–3, 5–7, 9, 12	—
Crystalate, Ltd.	52	1, 2	1, 2	5, 7–12	—	—	—	—	—	—	—	—	—	—	—
Ebonestos Industries, Ltd.	52	1–3	—	5–12	—	—	—	—	—	—	—	—	—	—	—
Folkard-Ferry, Ltd.	62	—	—	10	—	—	—	—	—	—	—	—	10	10	—
General Electric Co., Ltd.	13	1–4, 13	1, 12	6–12	—	—	—	—	—	—	—	—	—	—	—
Greenwich Plastics, Ltd.	77	—	—	—	8	8	8	8	—	—	—	—	—	—	—
Halex	51	1–4	1–3	5–12	5–8, 10, 12	—	—	—	—	—	4-9, 11	—	5, 6, 8, 10, 11	—	—
E. R. Holloway, Ltd.	50	—	—	5, 7, 12	8	—	—	—	—	—	—	—	8	8	8
Injection Moulders, Ltd.	53	—	—	4–12	—	—	—	—	—	—	—	—	—	—	—
Insulators, Ltd.	42	1–3	1, 2	5–12	—	—	—	—	—	—	—	—	—	—	—
Ioco, Ltd.	93	—	—	—	—	1	—	8	—	—	1	1	8	8	8
Kent Mouldings, Ltd.	5	1–4	1, 2	5–12	—	—	—	—	16	—	—	—	—	—	—
J. F. Kenure	49	—	—	5–11	—	—	—	—	—	—	5, 6, 8–11	5–7, 9, 10, 12	5–9, 11	—	5–7, 9
Lacrinoid Products, Ltd.	22	1–3	1–3	5, 7–10, 11	8, 10	—	—	—	—	—	7–9	1, 9	—	—	—
Litholite Insulators and St. Albans Mouldings, Ltd.	43	1–3, 13	1, 2	—	—	—	—	—	—	—	—	—	—	—	—
London Moulders (Plastics), Ltd.	8	1–3	1–3	5–12	—	—	—	—	—	—	—	—	—	—	—
Marston Excelsior, Ltd.	47	—	—	—	—	9	—	—	—	—	—	—	—	—	—
Melwood Thermoplastics, Ltd.	46	—	—	—	5, 6, 8, 10	—	—	—	—	—	—	—	—	—	—
Mica Products, Ltd.	52	—	—	5, 7–12	—	—	—	—	—	—	—	—	—	—	—
Microcell, Ltd.	25	1, 4, 8, 11	1	—	—	1–4, 7, 10	—	—	—	—	—	—	—	—	—
National Plastics (Sales), Ltd.	23	1–3, 13	1, 2	5–12	7, 8, 10	—	—	—	8	—	—	—	—	—	—
Permanoid, Ltd.	7	—	—	—	8, 10	—	—	—	—	—	—	—	—	—	—
Phoenix Rubber Co., Ltd.	90	8, 15	—	—	8, 15	—	8, 15	—	—	—	—	—	—	—	8
Punfield and Barstow (Mouldings), Ltd.	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rediweld, Ltd.	59	—	10	—	8, 10	—	—	—	8	—	8–10	8–10	8, 10	—	—
Rosedale Associated Manufacturers, Ltd.	33	—	—	5, 7, 8, 10	—	—	—	—	—	—	—	—	—	—	—
Storey Brothers and Company, Ltd.	70	—	—	—	—	—	8	—	—	—	—	—	—	—	8
The Streetly Manufacturing Co., Ltd.	24	1–3	1–3	5–12	—	—	—	—	—	—	—	—	—	—	—
Telegraph Construction and Maintenance Co., Ltd.	29	—	—	6, 7, 9, 10	8,10	10	—	10	8, 10	—	10	—	—	—	—
Thermo-Plastics, Ltd.	10	1–3, 4	1, 2	5–12	—	4	—	—	—	—	5, 7–11	1, 7–10	—	1, 2, 7–9	1, 2, 7–9
T.I. Plastics, Ltd.	27	—	—	—	8, 10, 12	4	—	—	—	—	—	—	—	—	—
United Ebonite and Lorival	32	1–3, 13, 15	1, 2	5–12	8, 15	8	8	—	—	—	8	15	—	—	—
Universal Metal Products, Ltd.	28	1–4	1–3	5–12	—	4	—	—	—	—	—	—	—	—	—
Wilmot Breeden, Ltd.	11	5, 8, 10	—	7–12	—	—	—	—	—	—	—	5, 7–10, 12	5, 7–10	5, 7–11	5, 7–11

The materials used by the companies are shown in the table by key numbers, as follows:—

1. Phenolic
2. Urea
3. Melamine
4. Polyester
5. Cellulose acetate
6. Other cellulose materials
7. Polystyrene
8. P.V.C.
9. Acrylic
10. Polythene
11. Other vinyl materials
12. Nylon
13. Bitumens
14. Casein
15. Ebonite

Moulding at the Witton Moulded Insulation Works of the General Electric Co., Ltd.

others. A different and important type of manufacture is that of synthetic-resin-bonded paper (S.R.B.P.) tubes (round and square) for electrical and general purposes, samples of which are exhibited. Also shown are samples of dual colour laminated bobbins (resin bonded) for the textile industry which are sold direct to the textile mills by Lumb Hall Engineering Co., Ltd., a subsidiary of Mica Products, Ltd.

The General Electric Co., Ltd. **13**
Magnet House, Kingsway, London, W.C.2.
Injection, compression and transfer mouldings.

THE company commenced moulding in 1916 and now possesses one of the largest moulding shops in the country, equipped with its own drawing office, tool room and assembly shop. It is able, therefore, to offer an unusually comprehensive moulding service and has 40 years' experience in meeting customers' requirements. The mouldings displayed illustrate this. They

MOULDERS AND FABRICATORS

include such varied products as radio cabinets, refrigerator trays, washing machine agitators, meter casings, torch cases, and electric switches.

A feature of this display is the variety of plastics materials represented. Melamine formaldehyde, phenol formaldehyde, urea formaldehyde, polystyrene, cellulose acetate, polymethyl methacrylate, polythene, and nylon are all moulded at the company's Witton Moulded Insulation Works and the G.E.C. is therefore free to use whichever is the most satisfactory economically and functionally, for a particular application.

The company also moulds bituminous compounds, which are widely used for sturdy liquid-resistant containers such as battery boxes and lavatory cisterns. A special high gloss finish material has recently been introduced here and examples of mouldings in these compounds can be seen on the stand.

Greenwich Plastics Ltd. **77**
St. Mary Cray, Kent.
Fabricators of p.v.c.

MANUFACTURERS of plain, printed and texturized p.v.c. sheeting, p.v.c. coated fabrics, p.v.c. extrusions and p.v.c. packaging materials, the company is showing representative samples of these various fields. Of special interest are the Craymac embossed and photogravure printed p.v.c., for the making-up trade, available in a complete range of colour effects and various types of embosses. Craylene p.v.c. film is shown made up into various types of industrial applications, such as packaging film, lay flat packaging bags, drum liners and pressure-sensitive adhesive tapes.

Craytex p.v.c. coated fabric is shown in made up form in a variety of garments for use both by the industrial and domestic user. The material is available in all colours and the range also includes a large number of special coated fabrics used by the various Service Departments.

Halex
(A Division of the British Xylonite Company) **51**
Moulders and fabricators for nearly all types of plastics materials.

THE exhibit consists in the main of a comprehensive display of injection mouldings for the refrigeration, radio and electrical industries, etc. The company is also showing a range of table and kitchen ware suitable for use in restaurants, canteens and institutions. Fabrications from sheet will include a polythene tank of ⅜-in. thickness 28 in. by 28 in. by 15 in. deep and a tote box fabricated from a laminated material which consists of a rigid vinyl material on the inside and flexible p.v.c. on the outside. In addition to the above is shown a comprehensive display of lighting fittings, internal and external, both moulded and fabricated from sheet. Apart from the table and kitchen ware, both marketed and manufactured, the rest of the items are manufactured by Halex for industrial customers.

E. R. Holloway Ltd. **50**
Bessemer Road, Welwyn Garden City, Herts.
Injection moulders and fabricators of thermoplastic materials.

THIS company is displaying their range of Barnet products and, apart from showing the largest range of combs in the world, are demonstrating manicures, vanity sets, and wallets made in quality plastics in consumer-tested colours. Nylon mouldings to the trade are also a speciality. A subsidiary company, Lustrac Plastics Ltd., is displaying samples of cellulose acetate moulding powders and p.v.c. extrusions.

Holoplast Ltd. **82**
New Hythe, near Maidstone, Kent.
Manufacturers of decorative and structural laminated materials.

THE exhibits on this stand include Decorplast decorative laminates, Holoplast structural cavitied panels and laminated sheets, and Corroplast corrugated roofing sheets.

Injection Moulders Ltd. **53**
Westmoreland Road, London, N.W.9.
Custom and proprietary moulders of industrial components, fancy goods and toys.

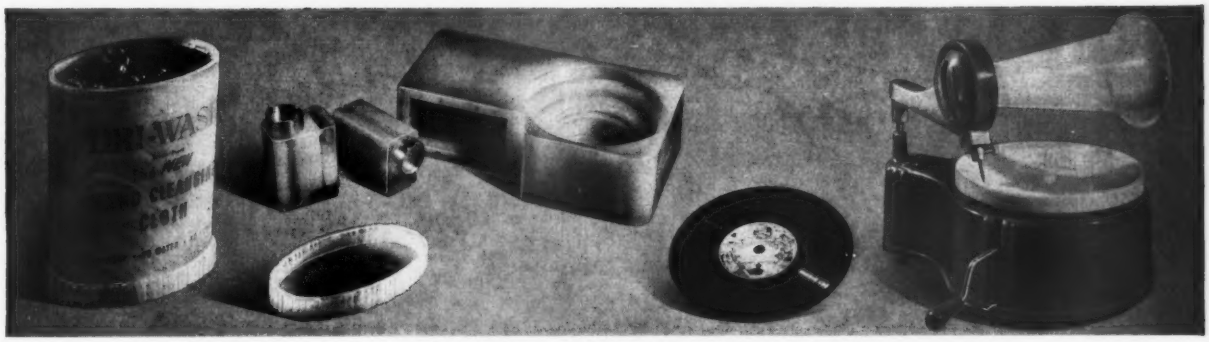
THE company specializes in the injection moulding of all the usual thermoplastic materials, polystyrene, polythene, cellulose acetate, cellulose acetate butyrate, nylon, acrylics and p.v.c. The very wide range of products is shown to demonstrate the industries which the company serves, including radio, television, refrigeration, automobile, pharmaceutical, aircraft, general engineering and packaging. A special feature is a strain-relief bush injection moulded in nylon and made under licence from the U.S.A., for distribution in the United Kingdom, the continent of Europe and the sterling areas. This bush is finding very wide application in electrical work, particularly for domestic applications.

Insulators Ltd. **42**
Leopold Road, Edmonton, London, N.18.
Compression, injection and transfer moulders.

MANY industries are represented on this stand through mouldings supplied by the company in the majority of thermoplastics and thermosetting materials.

Ioco Ltd. **93**
Netherton Works, Anniesland, Glasgow, W.3.
Manufacturers of laminated and sheet materials, in thermosetting and thermoplastic compounds.

AN entirely new note is struck by Ioco Ltd., with their range of Vicrtex. This is a vinyl texture fabric and comes in a wide variety of up-to-the-minute effects, and



Examples of injection mouldings carried out by J. F. Kenure Ltd., on show on the company's stand.

in a colour range sufficiently large to satisfy the most discriminating buyer. Its durable, scuff-resistant and easily washed surface, coupled with extreme flexibility, is of instant appeal for wall panelling, furniture coverings, etc., in all circumstances where hard wear is encountered. In addition, they feature their well-known Zapide range of p.v.c. coated leathercloths, and Plasco p.v.c. impregnated fabrics (and garments therefrom) for foul weather and industrial protection.

In the field of electrical insulating materials they are presenting class H silicone rubber and silicone varnish treated glass fabrics called Siloplast, Silopex and Silopex slot insulation. In the class B range they show epoxide resin varnished glass fabrics and their Linapex varnished glass fabrics and Terylene varnished cloths, Terapex.

Kent Mouldings 5
Footscray, Sidcup, Kent.
Moulders of both custom and proprietary goods.

KENT MOULDINGS are showing compression, transfer and injection mouldings for advertising, aircraft, communications, electrical engineering, radio and textile industries, and for toys and games.

Among the items on view are bobbins for the electrical and textile industries, radio and television knobs and radio-valve bases. Miniature components for hearing aids and miniature radio-valve pin protectors are interesting features, while other mouldings to be seen are ashtrays, aminoplastic beakers, educational toys, pulley wheels and TV tube masks and end protectors. Of special interest are moulded centre-shaft putter heads, scale models of lifting trucks and sports cars and coaxial cable connectors and harness for radar and V.H.F.

J. F. Kenure Ltd. 49
Faggs Road, Feltham, Middlesex.
Injection moulders.

A VERY comprehensive display of custom mouldings in polythene, nylon, cellulose acetate, polystyrene, etc., is shown. Injection mouldings are produced by the company for all industries in the full range of thermoplastics.

Lacrinoid Products Ltd. 22
Stafford Avenue, Gidea Park, Essex.
Manufacturers of custom and proprietary mouldings and fabricators of sheet material.

A WIDE range of compression, transfer and injection mouldings demonstrates the field covered by the company. They include custom-moulded components, the proprietary lines of the company, such as housing fitments, handles for all purposes and button blanks.

Vietum, a shrunk sleeving, is demonstrated by various applications.

Blow moulding is illustrated with polythene bottles made for various companies and nylon bottles.

Litholite Insulators and St. Albans Mouldings Ltd. 43
Sandown Road, Watford, Herts.
Manufacturers of custom and proprietary thermosetting mouldings.

THE chief exhibits on this stand are compression and transfer mouldings designed primarily for the electrical industry. The majority of them are made to the customer's own requirements. Examples exhibited include mouldings for power stations and electricity distribution, couplers for charging battery-driven vehicles and switch parts.

London Moulders (Plastics) Ltd. 8
364-6 Buckingham Avenue, Slough, Bucks.
Compression, transfer and injection moulders.

THIS exhibit shows a very wide range of trade mouldings covering both thermoplastic and thermosetting materials. London Moulders (Plastics), Ltd., with over 20 years' experience behind them, can claim to be experts in this very wide field. The mouldings displayed include interesting examples of soft p.v.c. high-impact polystyrene and glass-filled phenolic materials, as well as a selection of mouldings both large and small.

MOULDERS AND FABRICATORS

There is also displayed a range of household and kitchen products, including polythene bowls, etc.

Marston Excelsior Ltd. 47
Wobaston Road, Fordhouses, Wolverhampton.
Fabricators of acrylic materials.

THE products of the company, predominently used by the aircraft industry, and consisting of fabricated Perspex, are shown.

National Plastics (Sales) Ltd. 23
Avenue Works, Walthamstow Avenue, London, E.4.
Custom moulders to the engineering industry.

THIS company is showing a complete range of mouldings carried out for all plastics materials for a very wide range

An injection moulding shop at the Welwyn Garden City works of E. R. Holloway Ltd.

Injection Moulders Ltd. A view of the injection moulding shop.

of industries. These include electrical, mechanical, television, radio and automobile engineering. Products range from radio cabinets to small components in nylon and alkyd materials for use in electronic engineering.

Extrusions include very many types of rod, tube and strip made in various grades of p.v.c., and also tubes in clear polystyrene. A recent application of extruded products which has proved very successful is a complete handle in a vacuum cleaner, extruded, formed and fabricated at the works of National Plastics.

MOULDERS AND FABRICATORS

Melwood Thermoplastics, Ltd. **46**
Brewery House, High Street, Harpenden, Herts.
Extruders.

SPECIALISING exclusively in the extrusion field, the company is showing a wide range of sections supplied to all branches of industry.

Microcell, Ltd. **25**
Imperial Buildings, 56 Kingsway, London, W.C.2.
Moulders and Fabricators.

THIS exhibit is divided into three sections: packaging, engineering and general. Glass fibre reinforced polyesters play a prominent part in the work of this company.

In the packaging section, exhibits include glass fibre containers, moulded plywood containers, and various packaging materials. In the engineering section, square and round tubes are shown as load-carrying members. Also shown are rigid tubes for carrying liquids. Decorative panels, phenolic and urea mouldings, injection mouldings, and various other moulded items are shown in the general section.

Permanoid, Ltd. **7**
New Islington, Manchester, 4.
Cables, covered wires, insulated sleevings, mouldings and extrusions.

A FULL range of plastics, insulated wires and cables is being shown, including high temperature leads insulated with Permanoid VO grade material, suitable for use at temperatures up to 150 deg. C.

Phoenix Rubber Co., Ltd. **90**
2K Buckingham Avenue, Trading Estate, Slough, Bucks.
Fabricators of p.v.c. and polythene for custom production and compression moulders of p.v.c. and ebonite.

THE main feature of this stand is the company's range of Phenco flooring in both tile and continuous form. As a result of a pilot plant recently installed, flooring is now being manufactured in a finer finish where required. Excellent resistance to wear, domestic spillage and fire is a feature of this type of flooring.

P.v.c. sheet supplied in considerable bulk to the cable industry is also on display.

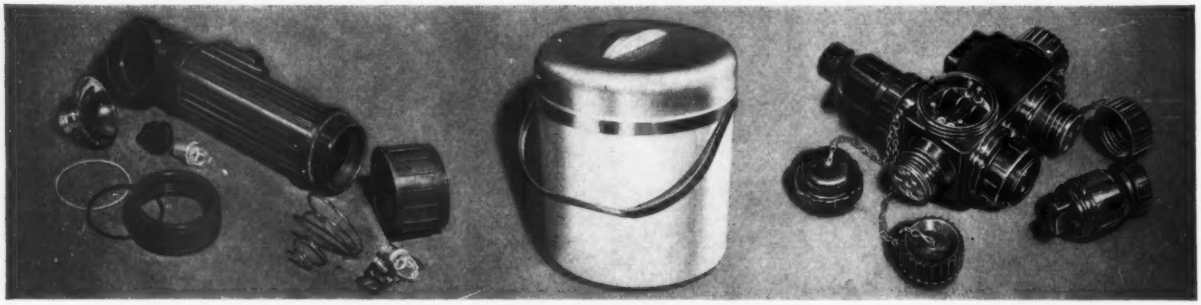
Punfield and Barstow (Mouldings), Ltd. **4**
Westmoreland Road, London, N.W.9.
Custom moulders for all trades.

THIS company is exhibiting an extensive range of components produced for all the major industries. The mouldings are manufactured from all the thermoplastic materials including nylon, cellulose acetate, polystyrene, etc.

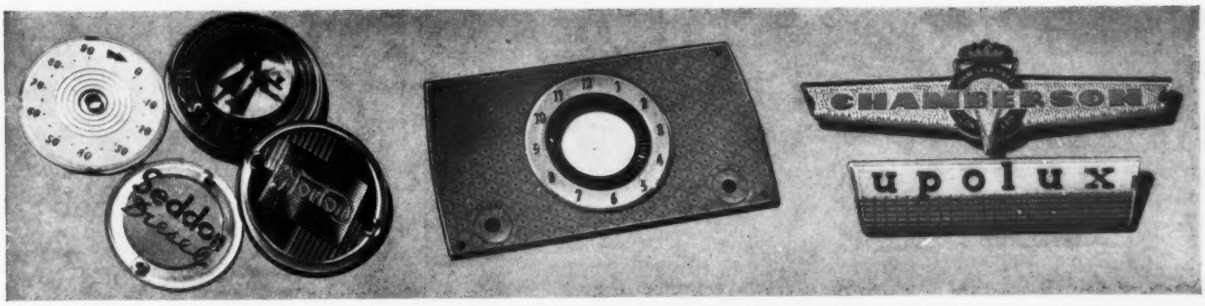
Amongst other lines shown are mouldings for the aircraft industry, accumulator cases and battery boxes, coil formers and mounting blocks, bobbins, and switch dollies for the electrical industry, scale blanks, grilles, knobs, valve holders, pointers, push buttons and battery cases, and cell plates for the radio industry, and decorative packing for the cosmetic industry.

Rediweld, Ltd. **59**
15-17 Crompton Way, Crawley, Sussex.
Fabricators of thermoplastic materials.

REDIWELD, LTD., are exhibiting polythene and p.v.c. fabrications mainly for the chemical industry. Among the polythene products, extruded 6-in. bore black polythene tubing is shown identical with the tubing which has been recently supplied to the Home Office for fire fighting and emergency water services. A complete rigid p.v.c. duct system with bends and branches is exhibited together with the latest type of moulded rigid p.v.c. ventilators which are fitted with injection-moulded polythene rotors. A new type of centrifugal pump for the conveying of acids and corrosive liquids, fabricated from rigid p.v.c. block is



The centre moulding is a food container recently introduced by E. K. Cole Ltd., and moulded in shock resistant polystyrene. On either side are intricate mouldings by G.E.C. Ltd. These are on show on the G.E.C. stand.



Examples of the three-dimensional name plates and badges manufactured by Wilmot Breeden Ltd., for the motorcar industry and others, on display at the exhibition.

also on display. The extrusion of clear transparent plasticized p.v.c. tubing is demonstrated on the stand using a Windsor extruder. Other exhibits include a complete range of plastic laboratory ware, including beakers, funnels, measuring cylinders and test-tube racks, and a rhovyl selecta filter paper made from unplasticized p.v.c. fibre suitable for the filtration of acids, etc.

Rosedale Associated Manufacturers, Ltd. **33**
11 Upper Grosvenor Street, London, W.1.
Injection moulders.

THE manufacturers of the Tudor Rose products have on show the injection moulds which have been used to manufacture their products for markets all over the world. Many examples of skilled craftsmanship in mould making can be seen together with a comprehensive display of products.

Stanley Smith and Co. **85**
Worple Road, Isleworth, Middlesex.
Manufacturers of rigid and flexible thermoplastic sheeting and extrusions.

THE main features on this stand are the rigid vinyl sheetings, flexible vinyl sheetings, polythene sheeting material suitable for lining tanks, vessels and drains, etc., and extrusions. In the last mentioned case, clear vinyl and polythene tubes are shown for conveying liquid foodstuffs and corrosive chemicals.

Storey Bros. and Co., Ltd. **70**
104A Park Street, Grosvenor Square, London, W.1.
Manufacturers of vinyl film and extruded fabrics.

HAVING specialized in the manufacture of vinyl sheeting, the company is showing examples of the very high quality of printed and embossed material suitable for rainwear, handbags, curtains and many other applications. In addition a large number of products from the company's material are shown to demonstrate the material's versatility.

Streetly Manufacturing Co., Ltd. **24**
Streetly Works, Sutton Coldfield, Staffs.
Trade moulders in thermoplastic and thermosetting materials.

STREETLY exhibits an impressive and representative selection of mouldings in all kinds of thermosetting and thermoplastic materials.

Streetly Melmex melamine ware, increasingly in use in canteens and catering establishments is well represented. First exhibited two years ago, a great deal has been learnt since and embodied in the moulded ware on display. The display takes the form of a tea room complete with a dish-washing machine, so that the items can be sampled and studied in actual use.

T. I. Plastics, Ltd. **27**
Creda Works, Blythe Bridge, Stoke-on-Trent.
Extruders of thermoplastics and thermosetting compounds and fabricators of reinforced plastics.

PERHAPS the most outstanding display on this stand is the range of samples of irradiated plastics. Next to this is polythene tubing produced from the new Ziegler material, probably the first offered in this country. The display also includes extrusions in a wide range of other plastics materials.

A range of polyester and epoxy resin-based glass fibre tubes in sizes from ½ in. to 12 in. bore is shown. These tubes are produced with an orientated glass-fibre roving and exhibit exceptionally high physical properties which have been the result of considerable work by Tube Investments' technicians over the past two years. A range of fittings, bends and T pieces and couplings are shown.

Telegraph Construction and Maintenance Co., Ltd. **29**
Telcon Works, Greenwich, London, S.E.10.
Fabricators of polythene, other thermoplastic materials and injection moulders.

THE emphasis on this stand is on Telcothene-coated papers and boards. The well-known characteristics of Telcothene make it ideal for use where a heat sealable, hygienic material with low water vapour permeability is required. Among its many applications may be instanced the following: a wrapping medium for food; a wrapping medium for metal components; a moisture barrier and anti-scuffing medium in multiwall paper sacks; drum liners particularly for the packing of materials which are affected by moisture; facing papers in cap liners. For packing material for service equipment to be stored under tropical conditions Telcon are also showing metal-foil laminate manufactured in conformity with M.o.S. Specification C.S.2200B.

A short demonstration showing the versatility and ease of application of Telcothene powder to metal objects of irregular shape is also a feature of the Telcon stand. Telcothene powder when fused imparts to metal surfaces an insulated plastic coating which provides protection against corrosion, mould growth and fungi and is chemically resistant. Telcothene powder is available in a range of attractive colours.

A selection of Telstic-coated materials will also be on display. Because of its excellent thermo-adhesive properties not only is Telstic coating on metal foil and paper of importance in the Crown Cork industry, it also meets a demand from the footwear and clothing industries.

For cable jointing purposes Telcon are also exhibiting Telcohesive jointing tape, and Telcompound for joint box filling. Both materials have electrical and mechanical characteristics designed for specialized applications.

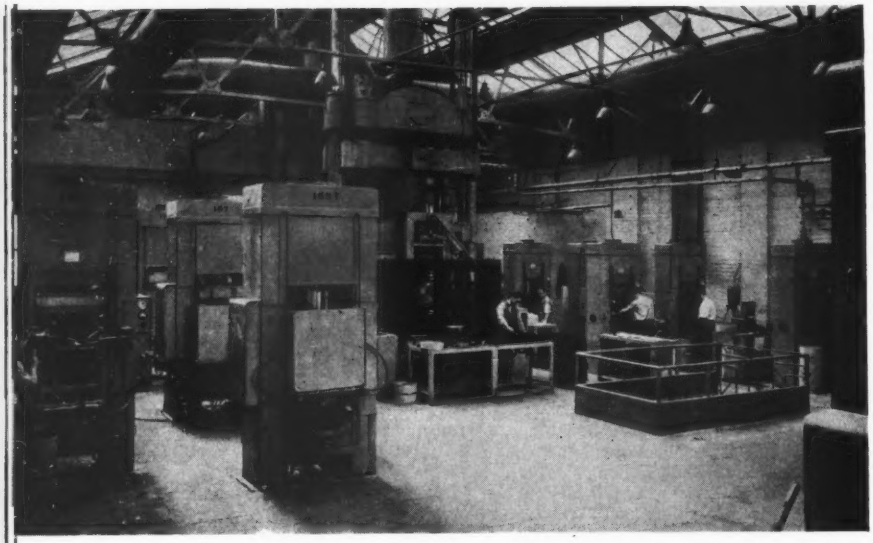
MOULDERS AND FABRICATORS

Thermo-Plastics, Ltd. **10**
Luton Road Works, Dunstable, Beds.
Custom and proprietary articles covering all plastics materials.

ONE of the main features on this stand is the range of very large mouldings in acrylic materials for advertising signs and display signs, food containers, catering equipment and sanitary fittings.

The company has established a reputation for large low-pressure mouldings, probably the most notable of which has been the Shell sign, made in acrylic sheet, with moulded lettering superimposed.

In rigid p.v.c., the company is showing a full range of refrigerator accessories, including door liners, breaker strips and television circuits, machine guards and housings. The moulding division of the company is represented by injection moulded products for industrial applications in cellulose acetate, polythene and polystyrene. Reinforced plastics are illustrated by the polyester/glass fibre materials and the asbestos reinforced plastics. In the former field, special emphasis is laid on products such as storage tanks, accumulator boxes



A view of the modern compression moulding works of the Streetly Manufacturing Co. Ltd.

and various types of housings and guards. Phenolic and silicone resins are also used as the bonding agent with the glass reinforced products.

Tufnol Ltd. **95**

Perry Barr, Birmingham, 22B.

Engineering laminates and fabrications.

THE company produces a wide range of thermoset laminated stock for machining based on the phenolic group of resins. On the stand are shown many applications of these materials, including a display of Tufnol gear wheels ranging from small gears for instruments to pinions for transmitting heavy loads. Displays of Tufnol slipper pads and water-lubricated rolling-mill bearings provide indications of the mechanical strength of the material. The excellent electrical insulating properties of Tufnol are demonstrated by an interesting display of electrical insulators and punchings. Other exhibits include a terminal board, jigs and pulleys, machinery parts, bushings and a display of marine fittings for yachts and heavier craft.

MOULDERS AND FABRICATORS

United Ebonite and Lorival, Ltd. **32**

Little Lever, Near Bolton, Lancs.

Fabricators of rubber and plastics materials, custom moulders and extruders.

A VARIED display of Lorival mouldings, extrusions and fabrications in a host of materials is arranged to show the design versatility and comprehensive production facilities available to the user of plastics or hard-rubber products in industry.

A group of injection mouldings in p.v.c., polythene, acetate and polystyrene is contrasted with Lorival compression-moulded products in urea and phenolic formaldehyde resins. Thin-walled extruded tubes—transparent and coloured—rigid tubes, rods and sections are shown with calendered p.v.c. sheeting for packaging, linings, and electrical insulation.

Special attention is directed at Lorival products for sanitary engineering. A Lynx cistern of striking contemporary design and a Kingfisher syphon mechanism injection moulded in polythene, both produced for Shires, are featured.

Another section of the display is devoted to mouldings, extrusions and fabrications in hard rubber illustrating the very wide applications of this material. The robust designs and high finishes obtainable are displayed by a range of battery boxes for Exide and other makers.

Universal Metal Products, Ltd. **28**

Langley Road, Pendleton, Salford, 6, Lancs.

Compression, transfer and injection moulders and fabricators of reinforced plastics.

EXAMPLES are shown of mouldings carried out by the above processes serving such industries as electrical and radio, refrigeration, surgical and packaging. A special display features the use of small intricate injection mouldings in the recently introduced Aerosol packaging field together with a comprehensive range of closures for collapsible metal tubes.

A section illustrating developments in the reinforced plastics fields includes examples of glass-reinforced containers for aircraft battery units and domestic trays. Examples of asbestos fibre reinforced phenolic are shown in typical applications for the aircraft industry, and a variety of products produced by the vacuum-forming technique for thermoplastic materials includes food display and handling trays.

A special exhibit is a large injection moulding tool which shows the craftsmanship of the U.M.P. tool-making division and the complex nature of the present-day moulding tools.

Utilex, Ltd. **96**

Mill Street, Kingston-on-Thames, Surrey.

Manufacturers of cellulose acetate film and sheet.

THE principal feature on this stand is the development by the company of a metallized acetate film. Now available in widths up to 32 in. and in silver, gold, red, green, blue and amber, the material is demonstrated by examples of packaging and also of vacuum formed articles. The full range of acetate film and sheet in clear transparent, coloured transparent, or coloured opaque is also shown.

Warerite, Ltd. **74**

Watton Road, Ware, Herts.

Manufacturers of Decorative Laminates.

WARERITE decorative panels and veneered board are shown in a wide range of colours and patterns for wall linings and furniture. Handy panels with plywood backing for easy application are shown as being specially developed for the " do-it-yourself " handyman. Some examples of original artist's designs being incorporated for preservation without loss of detail are also shown.

Warerite panels are widely used in bars, restaurants, shops, ships and trains, and for domestic furniture and fitments, especially in the kitchen. For extra strength, aluminium cores and metal-mesh interlays are available. Non-slip embossed surfaces and prefabricated sections, ready to screw to frames, are supplied.

The Yorkshire Copper Works, Ltd. **6**

Leeds, Yorkshire.

Manufacturers of plastics and non-ferrous metals, tubes and fittings.

THE company, having long experience in the manufacture of high quality non-ferrous tubes and fittings has now expanded its activities to include plastics tubes and fittings. Examples are shown as follows: Polyorc A polythene tubes to B.S. 1972 and 1973, Polyorc B, a non-plasticized rigid p.v.c. tube, Polyorc D, high impact polystyrene tubes and Polyorc plastics fittings. Examples showing the method of jointing and fabricating these tubes are on view.

Wilmot Breeden, Ltd. **11**

Amington Road, Birmingham, 25.

Moulders and fabricators for custom and proprietary work.

THE exhibits on this company's stand stress particularly new items, produced by injection moulding for use in the automobile, electrical and domestic appliances industries. Of special interest are the three-dimensional mouldings for use as badges, nameplates, dials and scales.

PRESS AND OFFICIAL EXHIBITORS

Associated Iliffe Press Ltd. **15**

Dorset House, Stamford Street, London, S.E.1.

Publishers of technical, trade and specialized journals, technical year books, etc.

PUBLISHERS of the monthly journal, *British Plastics*, and organizers and sponsors of the British Plastics Exhibition and Convention. On the Associated Iliffe stand special prominence is given to *British Plastics* and also to the "British Plastics" Year Book, the comprehensive guide to Britain's plastics industry. Also represented on this stand are the numerous other publications of the company.

The British Plastics Federation **3**

47-48 Piccadilly, London, W.1.

The trade association for the plastics industry.

THE British Plastics Federation represents the plastics industry in Great Britain from the manufacturers of the basic raw materials to the manufacturers of the finished plastics products. Membership of the Federation includes manufacturers of plastic materials, moulders, fabricators, laminators and the manufacturers of processing machinery. The Federation has an information bureau which provides full information about the sources of supply of materials or finished products, also answers to technical inquiries where these are required. In addition the Federation has a comprehensive library and publishes monthly abstracts of nearly all journals dealing with plastics. Special attention is given to technical matters, a large number of technical committees being engaged in the preparation of specifications for plastics materials and products, and the advice of these technical committees is always available to answer questions of special complexity. Full information about the British plastics industry and membership of the Federation may be obtained on the stand or at the above address.

Temple Press Ltd. **60**

Bowling Green Lane, London, E.C.1.

Proprietors of technical journals, including "Plastics," a monthly periodical devoted to the manufacture, uses and potentialities of plastic materials. Publishers of technical books.

THE main emphasis on this stand is on the monthly journal *Plastics*, published by Temple Press Ltd. In addition, special attention is focused on the technical books published by the company and dealing with various aspects of plastics technology. These include: *Cellulose Acetate Plastics*, by Vivian Stannet; *Moulds for Plastics*, by W. M. Halliday; *The Theory of Polymerization*, by H. R. Fleck; and *Plastics, Scientific and Technological*, by H. R. Fleck.

Amongst the periodicals associated with *Plastics* are: *Light Metals, The Oil Engine and Gas Turbine, Commercial Motor, The Motor, Motor Ship, Motor Boat and Yachting* and *The Overseas Engineer.*

On the stand can be seen examples of current productions of a number of companies, and some special items comprising decorated mouldings carried out specially for *Plastics.*

BRITISH PLASTICS CONVENTION, 1955

The Third British Plastics Convention is being held at Olympia, concurrently with the Exhibition. Summaries of the Papers to be read are given herewith, together with times and authors

The Synthesis of New Types of Addition Polymers

by H. W. Melville, F.R.S., Mason Professor and Head of Department of Chemistry, University of Birmingham
June 2, morning

SEARCHING for new types of addition polymers which might have unusual properties, and differing to considerable degrees from existing materials, three lines of research have been pursued in recent years.

First, the synthesis of so-called block copolymers, in which the distribution of repeating units in the polymer is not random as it would be in a normal copolymer, but is non-random. There are now a number of methods of synthesizing such polymers by supersonic methods, mechanical methods, emulsion methods, by certain photochemical methods, and by utilizing the properties of radicals in flow systems. A survey will be made of the methods which have already been used for this purpose.

Secondly, attempts have been made to synthesize branched chain molecules to a predetermined pattern in order to see how the progress of branched chain molecules compares with that of linear molecules. Similarly, progress has been made in computing the extent to which normal vinyl polymers are branched.

Finally, there is the so-called graft type of polymer in which a branch is grafted on to a polymer backbone of a different chemical constitution from the backbone.

Effect of High-energy Radiation on Long-chain Polymers

by A. Charlesby, D.Sc., Atomic Energy Research Establishment
June 2, afternoon

THE discovery that the properties of long-chain polymers can be considerably modified by exposure to high-energy radiation offers the promise of a valuable new industrial process. The most useful aspect of this process is that many thermoplastic polymers can be changed to thermosetting polymers without the addition of other chemicals to the pure polymer, and that no temperature changes are involved, so that a product once moulded can be fixed in shape by irradiation.

The various sources of radiation at present available or under development will be described, together with methods of estimating the cost of treatment. This cost is likely to diminish very rapidly as more powerful sources of irradiation become available, and the present period should be considered as one of development, and of small-scale production for specific purposes where no alternative chemical methods are available.

Radiation offers a very useful tool in the study of the physical properties of polymers. Recent experimental results obtained by the radiation treatment of a number of polymers (notably polythene, rubber and silicones) will be discussed. Additions of small amounts of protective or inhibiting agents can greatly affect the radiation-induced effects, and work along these lines shows many close analogies with results obtained in radiobiology. We may expect radiation research in plastics to assist in solving many of the problems arising from the interaction of radiation with the living cell.

The Molecular Weight of Polythene—Its Determination and Significance

by S. W. Hawkins, B.A., Research Department, Imperial Chemical Industries, Ltd., Alkali Division
June 2, afternoon

DURING the past two or three years progress has been made in the determination of the molecular weight of commercial polythene samples. Since polythene is generally a mixture of a wide variety of molecules differing in size, it is necessary to express the results as an average of one sort or another, and the simplest and most useful is the number average $\bar{M}n$ which is the one obtained by methods depending upon "colligative" properties. Up to a $\bar{M}n$ value of 15,000 the ebulliometric method, developed by Ray and subsequently improved by H. Smith, is the most useful and the results are very reproducible provided a given technique is adhered to.

The region between 15,000 and 25,000 presents some problems since the appearance of frothing makes ebulliometry increasingly difficult as the molecular weight rises. The osmometric method, described by Harris, suffers from the danger of solute diffusion

when the molecular weight is too low but is reliable and reproducible above 25,000. Over the whole range of molecular weights encountered justifiable comparisons between two samples can be made only if the same technique is used for both.

For the determination of the weight-average molecular weight $\overline{M}w$ there is at present available the light-scattering technique although, owing to the very high dissymmetries shown by some polythene solutions, practical and theoretical difficulties are considerable. It is found that the ratio $\overline{M}w/\overline{M}n$ for many polythene samples is very high (up to at least 20), showing that polythene can have a wide molecular weight distribution.

As a consequence of the wide variations shown by commercial polythene not only in molecular weight but in breadth of distribution and frequency of chain branching, the specification of one physical property only, such as melt fluidity or grade number, does not serve to define the polymer. Examples show that grade 2 polythene can possess, according to the method of manufacture, number-average molecular weights varying between 23,500 and 38,000, while important physical properties, such as low-temperature brittleness and ultimate tensile strength, show a wide range of values. This emphasizes the need to choose a polymer for a given purpose by subjecting it to tests which are representative of the service expected rather than on the basis of grade number alone.

The Chemistry of Modern Blowing Agents

by R. A. Reed, B.Sc., Ph.D., F.R.I.C., Chief Development Chemist, Genatosan, Ltd.
June 3, morning

THE paper leads up to the subject by a brief review of the methods employed to produce expanded plastics and then concentrates on the method employing chemical compounds which disengage gas on heating.

The desirable properties of such a chemical compound are enumerated, it being shown that none yet discovered is perfect in behaviour.

The chemical properties of all the known blowing agents are compared with the "perfect specimen."

Physical properties of the expanded products are given as available and a range of samples presented for examination.

Some appropriate methods for the use of selected blowing agents are given.

CONVENTION PROGRAMME AND SUMMARIES

The Technology and Uses of Polyurethane Foams

by L. N. Phillips, A.I.R.C., Senior Scientific Officer, Royal Aircraft Establishment, Farnborough
June 3, morning

THE manufacture and industrial use of polyurethane foams has spread since the war from Germany—where they were first developed—to the U.S.A. and this country. The basic chemistry is relatively simple but the technology is quite complex and must be understood before effective development of good-quality products can take place.

Both rigid and flexible foams can be made by reacting a di-isocyanate with special alkyd resins.

The three predominant reactions are:—

(1) An addition reaction between the isocyanate and hydroxyl groups.
(2) A condensation between the isocyanate and a carboxyl group leading to the formation of carbon dioxide.
(3) Reaction between a water molecule and the isocyanate again leading to the elimination of carbon dioxide.

The alkyd for making rigid foams is normally based on saturated dicarboxylic acids and a trihydric alcohol. The excess of alcohol ensures a considerable hydroxyl number and by varying the extent of reaction a larger or smaller carboxyl content can be obtained as desired. It is primarily the acid content of the resin which governs the evolution of carbon dioxide and therefore the density of the final foam.

In order to produce light even foams a definite mixing technique is required and thus is described in some detail.

The foamed-in place technique has been used for making sandwich constructions particularly where precision of core thickness is desired and where other methods of making complex structural shapes are inconvenient. It is also used for sealing cavities and as a lightweight insulation material. The procedure for the manufacture of flexible foams is rather different.

Dispersion of Polytetrafluoroethylene

by H. M. Whitcut, B.A., Technical Service and Development Department, Imperial Chemical Industries, Ltd., Plastics Division
June 3, afternoon

POLYTETRAFLUOROETHYLENE was first polymerized in the U.S.A. in 1941 using such catalysts as ammonium persulphate and hydrogen peroxide. A granular polymer was obtained which was found to have exceptional properties. It had a working temperature range extending up to 300° C. combined with extreme chemical inertness and solvent resistance, good mechanical properties, first-class electrical properties and a very low coefficient of friction. It found many specialized applications but its development has been hampered by the fact that above its transition point of 327° C. it shows very little flow and is mechanically weak. Normal plastics fabrication techniques cannot be used therefore, and the only methods available are similar to those used in powder metallurgy. A preform of the desired shape and size is compacted from the polymer in the cold and is subsequently baked at 350-400° C. when it coalesces into the massive form.

In 1946, however, aqueous dispersions of polytetrafluoroethylene (particle size less than 0.5μ) were first obtained using a dibasic acid peroxide catalyst. These immediately broadened the field of applications as the dispersion could be handled in new ways to give finished forms impossible to prepare from the granular polymer. To prevent coagulation during polymerization the concentration is taken to not more than 5-10%, but, after stabilizing, the dispersion can be concentrated, for example by electrodecantation, to 70% solids. Suitably stabilized dispersions can also be modified by adding other constituents, to give a dispersion with improved adhesion to metals.

New Nylon Polymers and Compositions

by R. H. Birtles, B.A., B.Sc., Technical Service and Development Department, Imperial Chemical Industries, Ltd., Plastics Division
June 3, afternoon

THE nylon polymer manufacturing capacity in Great Britain has recently been increased. This increase has coincided with the introduction of a much wider range of nylon polymers and co-polymers, both plasticized and unplasticized, designed specifically for the plastics industry. Although this paper is primarily concerned with plasticized and unplasticized compositions based on 66 and 610 polymers, their relationship to 6 and 11 nylons is also discussed. The chemical and mechanical properties of these new materials are discussed in some detail, and in particular the variations in properties with composition.

The properties of nylon in relation to other plastics materials and metals are discussed, from which it is seen that in many respects nylon is more similar to metals than are other plastics. Finally, applications for nylon are reviewed.

Fundamental Problems of Single-screw Thermoplastic Extruders

by E. Gaspar, M.I.Mech.E., Chief Designer, Projectile and Engineering Co., Ltd.
June 6, morning

AS a result of extensive theoretical work on single-screw extruders, mainly in the United States, a number of suggestions affecting the fundamental design of contemporary machines has been advanced. In view of the possibly far-reaching effects of these suggestions on extruder output, complexity and cost, the theoretical basis of these suggestions has been examined, and the conclusions reached have been checked against results obtained from experimental work.

The main purpose of the paper is to investigate the energy requirements of a single-screw extruder, and to clarify the nature of the relationship between the total power input to the machine and the screw rev./min. A simplified theoretical justification of the square-law relationship between motor power and screw is advanced, and the manner in which actual power requirements vary from these predictions is examined.

Screw power requirements are investigated for a wide range of material temperatures, and the existence of an upper limit to the screw speed of an extruder is discussed from a theoretical viewpoint, and demonstrated by experimental results.

The question of so-called "adiabatic" extrusion has been examined, and the practicability of approaching such conditions in a standard machine has been discussed at some length. The advantages to be gained from working an extruder at or near the

"adiabatic" state have been investigated, and illustrations have been prepared to show the energy relationships between all the heating and cooling mechanisms over wide screw speed and temperature ranges. From these energy relationships, it has been possible to obtain fairly close approximations to the thermal efficiency of an extruder at various screw speeds, and to compare the efficiencies of a number of screws.

In addition to these energy relationships, comparisons have been made between the performances of a series of screws over a wide range of material temperatures, and the influence of die aperture on screw performance has also been examined. The relative merits of single- and double-start screws are discussed at some length in the light of results obtained from runs on both types of screw.

Finally, although the main body of experiments was carried out on polythene, certain suggestions are made about the performance of a single-screw machine on other materials.

Work Study in the Plastics Industry

by J. Grange Moore, M.A., Deputy Head of Central Work Study Department, Imperial Chemical Industries, Ltd.
June 6, afternoon

UNFORTUNATELY, work study to many people still means getting workpeople to work harder. But economy in labour may be, in any one company, very low in the scale of savings that can be achieved. Considering the real resources of industry as labour, materials and capital, it can be shown that the work-study approach can bring dramatic economies in the last two as well as the first.

With high capital investment per producer in the heavy chemical industry we must give much attention to possible savings in materials in capital investment. In plastics production, however, significant economies can also come from more effective use of operatives' time. To get a proper perspective, it is useful to think of the available ways of increasing productive efficiency:—

(1) Research and development.
(2) New and improved plant and equipment.

These are long-term activities requiring capital.

(3) Simplification and reduction of variety in the product.

The possibilities here are limited, but considerable benefits can come from standardization.

(4) Improving existing methods of plant operation.
(5) Improving the planning of work and use of manpower.
(6) Increasing individual effectiveness.

While there may be limits to what these may achieve, they require little capital outlay and can produce quick dividends. Increasing the profitability of existing resources can in fact provide the capital for the long-term projects.

The application of work-study techniques, therefore, provides a starting-point for the business which cannot look to large capital resources. The techniques are divided into method study, which sets out to improve ways of doing work; and work measurement, which aims at establishing the proper time for a task.

Method study proceeds by systematic analysis of existing or proposed methods and the development of improvements by critical examination. Work-measurement techniques enable us to determine the work content of jobs and to exercise better planning, manning and control—as well as to set up sound incentive schemes.

(Practical examples will show applications of work study affecting the plastics industry or providing good analogies to problems likely to occur in manufacturing.)

These and similar successful examples are evidenced in detail of the savings that can be effected. The benefits enjoyed have in turn contributed to the tone of the nation's economy; for while raw material prices to I.C.I. have risen since 1938 by 266%, sales prices *to* I.C.I.'s customers have only risen by 90%.

Productivity and Methods in Moulding

by A. L. Sparshott, B.Sc., Development Engineer, Witton Moulded Insulation Works, General Electric Co., Ltd.
June 6, afternoon

THE paper will discuss the origin of the term productivity in the sense in which it is now known. Various indices which can be used in connection with the measurement of productivity will be examined with particular reference to their use in assessing moulding shop output.

Some factors influencing productivity in compression and transfer injection moulding of thermosetting materials will be outlined, including reference to the design of mouldings. Typical press procedures will be analysed for common causes of low productivity. Injection moulding of thermoplastic materials will then be considered along similar lines. Finally, the relationship between high productivity and quality will be discussed.

The Effect of Injection Moulding Variables on the Quality of Mouldings

by K. C. Bryant, M.A., B.Sc. and G. Hulse, M.Sc., A.Inst.P., Monsanto Chemicals, Ltd.
June 7, morning

WORK has been carried out using a specially designed test mould to explore the effects of injection moulding variables: injection pressure, cylinder temperature, mould temperature and gate position on properties such as dimensional reproducibility, flexural, tensile and impact strengths, deformation at break, weld line strength and craze resistance of injection mouldings in general-purpose polystyrene.

The results can be explained largely in terms of varying degrees of molecular orientation induced by the different moulding conditions. Within the limitations of the variables investigated, it has been possible to determine the conditions which should be used to produce mouldings with isotropic physical properties and to minimize the effects of weld lines in those designs where they cannot be avoided.

An interesting side effect which has been observed is the importance of ensuring proper venting of the cavity, since pressure burning, as well as marring the appearance of mouldings, can have a marked effect on physical properties.

Recent Advances in Injection Moulding Techniques and in the Evaluation of Moulding Materials

by G. Campbell, B.Sc., Technical Service and Development Department, Imperial Chemical Industries, Ltd., Plastics Division
June 7, afternoon

IN the evaluation of new moulding materials for injection moulding, it is desirable to have a standard means of assessing behaviour under practical moulding conditions. Simple laboratory determinations of melt viscosities, for example, cannot always predict the characteristics of new polymers in injection moulding machines as they are generally made at lower shear rates than those used in moulding practice and do not take into account the chilling of the thermoplastic by contact with the mould surfaces. There is evidence that materials which have equivalent flow values as determined by tests now used internationally may show quite different behaviour in injection moulds.

Before an injection moulding machine can be used for assessment of new materials it is necessary to remove machine variations which might obscure important characteristics of new materials. Attention has been given, therefore, to elimination of temperature "hunting" within the plasticizing unit and the mould, to control of injection pressure and of feed. The machine is run at a low percentage of its rated capacity in order to obtain a high "heating efficiency" and also to avoid temperature fluctuation from shot to shot.

An injection moulding machine of a commercial type has been modified and used to compare the flow characteristics of thermoplastic materials under conditions representative of normal commercial practice. The system is of interest when comparing different polymers and results show high reproducibility. The information obtained from the test gives a very good indication of performance in the field.

CONVENTION PROGRAMME AND SUMMARIES

Runners, Gates and Vents for Thermoplastic Moulds

by A. G. Elwell, Technical Service Representative, B.I.P. Tools, Ltd.
June 7, afternoon

ONE of the most controversial subjects encountered in the design of thermoplastic injection moulds is undoubtedly the arrangements for feeding.

Most designers have their own ideas of feeding a specific cavity shape and the chief designer often finds himself hard pressed to make a final decision in this matter.

The paper sets forth to outline some of the schemes which may come before the chief designer, and attempts to evaluate the worthiness of some of those to be included in a final mould arrangement.

Designs mentioned are mostly based on the author's own previous experience, many

of them happy, and a few distinctly otherwise, and the paper describes these in some detail.

Whilst the paper deals mainly with feeding arrangements it has, at times, been found necessary to refer to other features and, therefore, some mention will be made of automatic stripping, unscrewing, the use and manipulation of beryllium copper. It also hazards a viewpoint on the future trends of design and performance.

British and International Patent Practice as It Relates to the Plastics Industry

by a Chartered Patent Agent
June 8, morning

THE grant of patent monopolies is based upon the Statute of Monopolies dated 1624, the general provisions of which have been accepted by all major countries throughout the world.

The basis of the grant of a patent monopoly is that the inventor, or someone who derives title from him, is given the right to prevent others from using an invention for a specified term of years in exchange for a complete disclosure of the invention and the way it is to be carried into effect. This complete disclosure must be such that any third person should be capable of carrying the invention into effect merely from a reading of the patent specification assisted by his general knowledge in the field to which the invention relates.

Recent Developments in the Use of Plastics in the Foundry

by P. G. Pentz, B.Sc., Technical Sales Manager, Leicester, Lovell and Co., Ltd.
June 8, afternoon

IN the use of synthetic resins to bond sand for making solid foundry cores, new developments are to be found mainly in refinements of the resins—still chiefly u.f.

CONVENTION PROGRAMME AND SUMMARIES

and p.f.—and in methods of securing rapid cure, thus taking full advantage of the intrinsic properties of these thermosetting materials. Techniques used include h.f. heating and, more recently, blowing of resin-sand mixture into a heated corebox. The rheology of resin-bonded sands has been investigated and the results obtained should assist in overcoming core-blowing problems.

Hollow-shell cores with many advantages over solid cores are coming into prominence as an offshoot of the shell-moulding process, being made possible by the advent of non-segregating (pre-coated) resin-bonded sand. Various methods and specialized equipment have been developed for making shell cores, using simple dump/shake-out, blow/suck or limited-blow techniques. Economies are obtained in material costs, production time and fettling costs (through improved casting finish), consequently, a rapid extension of shell core production is envisaged. Resins used for this purpose are almost entirely of the phenolic type, but include both resoles and novolacs with hexamine.

The use of such resins in pre-coating sand for shell moulding has received much attention. Several methods of pre-coating sand have been proposed but only the F.E.L.L. process has been used on any substantial scale in Britain. Advantages of pre-coated sand for use in making shell moulds, in addition to the obvious absence of segregation which the term "pre-coated" implies, are discussed in relation to alternative shell-moulding materials. The rapid development of shell moulding in British foundries during the past year or two is attributed to the availability of automatic or semi-automatic shell moulding machines, a clarification of the patent position, and the wide dissemination of knowledge and experience through the foundry industry—a process in which the plastics industry has played an important part.

The translation of shell moulding from semi-laboratory development work to full-scale production has brought into focus problems which were previously unrecognized except perhaps in the U.S.A. where the process came earlier into large-scale use. Minor differences between grades of resin are becoming significant through their influence on such production variables as investment and curing cycles. Health problems associated with dust from the fine silica sand, and to a lesser extent the powdered resin, claim serious attention, and point to the substitution of the apparently innocuous pre-coated sand wherever possible. The need for recovery and re-use of shell moulding sand has become apparent in consequence of the limited availability of new sand in the quality required. More rapid and flexible methods of securing half-moulds are needed to meet varying production conditions.

Among the smaller applications of plastics in foundry work is the use of thermosetting resins, normally p.f., for improving the surface of conventional "green-sand" moulds and so obtaining better casting finish. Furane resins have been found surprisingly inferior to phenolics for this purpose, but their outstanding heat resistance has been put to good use in making cheap core carriers for moderate runs. The possibility of casting patterns in furane resin compositions is being explored with a view to their use in place of metal patterns for shell moulding on short runs. For patterns and coreboxes used cold, cast epoxide resins hold great promise and are being actively investigated.

Consistency in Glass-reinforced Moulding

by J. Rees, Superintendent, Plastics Department, Bristol Aeroplane Co., Ltd.
June 9, morning

PAST experience in the manufacture of glass fibre mouldings has proved that complicated shapes can be produced with comparative ease, and although dimensional accuracy can be reasonably maintained, no guarantee whatsoever in respect of consistency of the finished product has hitherto been possible. It is the purpose of this paper to show how this all-important feature can be attained.

It is an established fact that over the past few years the field of application of glass fibre mouldings has shown a marked increase, but the increase will not be accelerated, or even maintained, until much greater uniformity of mouldings has been achieved.

The author has in mind structural engineers and particularly aircraft engineers. If these engineers can be convinced of the uniformity of certain properties of glass fibre laminates, then, providing the minimum values are sufficiently high in relation to the material density, they may well turn over to its greatly extended use.

The fact is that theory indicates that providing certain minimum mechanical properties are attained, then the structural weight of an aeroplane will be very much less than if it were built in any metal, except magnesium alloy, for certain types of aircraft. While the theoretical gain is based on high strength and stiffness characteristics in relation to density, and such figures have certainly been attained, what the structural engineer wants to know is what *minimum* strength values can be *guaranteed*, the occasional very high value being of no interest to him; but equally he wants very accurate information on notch sensitivity, fatigue values, both dynamic and static (creep). If reliable data on these physical and mechanical properties can be produced, then the engineer will show immediate interest in the primary use of glass fibre. But it is the author's contention that the evidence of uniformity will not be forthcoming while present methods of preparation of laminates and mouldings generally continue to be used.

There are other properties apart from occasional high strength and stiffness figures for impregnated glass fibres which have been demonstrated as indicative of the very desirable qualities of fibre mouldings, for example, resistance to both hammer blows and penetration by sharp objects. There has been much—what one can only term—showmanship on these lines. This is to be deprecated and such demonstrations will not assist the industry in selling the product. Such demonstrations do make manifest very important and useful properties of the material, but the paramount need at the moment is uniformity of properties, and until this is done it is difficult to see how manufacturers of resins and glass fibre can expect much extension of their activities.

The essence of the matter is the establishment of manufacturing methods which can be rigidly controlled, ensuring knowledge of the exact composition of mouldings. When that stage has been reached, consistency of mechanical and other properties will follow, as will also the greater extended use of glass-reinforced plastics.

During the past few years the relevant problems have been closely examined in the Plastics Department of the Bristol Aeroplane Co., Ltd. (Aircraft Division), and the author, who has been instrumental in the development of the process, intends to show how the difficulties can be successfully overcome. The paper will be amplified by illustrations depicting the earliest experiments, together with the author's interpretation of application of the process to quantity production in commercial fields.

Reinforced Plastics in Automobile Construction: Their Advantages and Limitations

by H. Silman, B.Sc., F.R.I.C., F.I.M., M.I.Chem.E., Research Manager, Ford Motor Co., Ltd., Engineering Research Centre, Birmingham
June 9, morning

THE use of reinforced plastics for automobiles has been the subject of much study, but practical application has so far been limited. The available methods of construction are described, including wet-lay-up and preform moulding techniques. Cost considerations and problems of space, tooling and labour, in so far as mass-production is concerned, are assessed.

The trends in the development of laminated plastics are discussed, together with some of the problems to be overcome before increased utilization of the new technique can come about.

Chemical Engineering Possibilities of Glass-reinforced Plastics with Special Reference to Polyester Resins

by V. Evans, M.Sc., F.R.I.C., A.P.I., Special Director and Chief Chemist, Prodorite, Ltd., and J. R. Stevenson, B.Sc., A.R.I.C., A.M.I.F., Chemical Development Manager, B.I.P. Chemicals, Ltd.
June 9, afternoon

ESSENTIAL features of resin glass/fibre laminates of interest as potential chemical engineering materials of construction include strength combined with lightness, chemical resistance, comparative ease of fabrication, good electrical properties and through colouring.

Brief consideration of the methods of manufacture of glass fibre and the various types available, namely woven cloth, rovings, diamond mat and chopped strand mat. Sizings used in the production of glass fibre, methods of removal and the effect of the various types of size removal on adhesion of the laminating resin. In all these types the glass involved can be high or low alkali glass. Treatment of fibres to improve resin adhesion, methacrylated chromic chloride, vinyl trichlor silane.

There is a family of polyester resins and formulations can be altered to suit desirable end properties. The following resins are discussed:—

- Resins with low, intermediate, and high reactivity.
- Resins with low, intermediate, and high viscosities.
- Resins with different monomers, i.e., styrene, diallyl phthalate and triallyl cyanurate; D.A.P. resins mean low monomer loss with extended cure on large area single moulds; T.A.C. resins confer good heat resistance.
- Resins with good chemical corrosion resistance.
- Resins of the self-extinguishing type.
- Resins made into aqueous emulsions.
- Resins possessing light stability.
- Pre-impregnation resins.
- Catalysts and accelerators for cure at room temperature and elevated temperatures.

Brief mention of other types of resins which can be used for fabrication of glass-fibre laminates, epoxide, phenolic, furane and silicon resins, with particular reference to their chemical resistance and mechanical and thermal properties.

Consideration of the general properties of the resultant glass fibre/resin combination and the laminates formed from them.

Handling the resin/glass combination includes:—

(a) Hand lay-up.
(b) Lamination.
(c) Pre-impregnation.
(d) Preforming and matched tooling.
(e) Dough mixing and moulding.

(a) concerns inexpensive tooling, low volume production and hand labour, usually with cold curing.

(c) is relatively new and involves the purchase of resinated stock. This necessarily involves two moulds and cure under heat.

(d) involves preforming which really means making a glass mat to the desired shape—this is then moulded in matched tools and can be carried out in a heated low-pressure compression press or via the rubber-bag technique under vacuum or moderate air pressure. There are three methods of preforming, namely, the plenum system, slurry method, and "open" method.

(e) involves mixing in specially designed equipment the parent resin, reinforcing filler and inert filler. The latter is necessarily cheap and thus this is a method of producing a relatively inexpensive moulding compound of high-impact resistance.

Consideration of the principal features relating to design of chemical engineering equipment using polyester/glass fibre laminates. Comparisons with other chemical engineering materials of construction with special reference to advantages and disadvantages. Consideration of certain inherent limitations of polyester/glass fibre laminates.

Chemical engineering applications including pipes, tubes and ancillary fittings, tanks, vessels and similar equipment; tanks for road transport; linings to tanks, vessels and similar chemical plant.

The reinforcement discussed so far has been glass; other forms can be considered, namely, the established paper, hessian, sisal, asbestos, rayon, and the newer synthetics like nylon, Terylene, acrylonitrile, must not be lost sight of.

Resin/fibrous glass tools have been made and used in power-operated presses for shaping sheet metals such as mild steel and aluminium. We have the full turn of the cycle where steel is being shaped by plastics.

The Testing and Development of High-quality Glass Fibre Polyester Laminates

by P. H. H. Bishop, B.Sc., and E. Haythornwaite, B.Sc., Scientifics Officer, Royal Aircraft Establishment, Farnborough
June 9, afternoon

AN outline is given of the present state of development of high-quality glass fibre/polyester laminates. Some of the basic tests for laminates from the points of view of the engineer and of the chemist are considered in detail. The information required by the design engineer is discussed. The importance of chemical methods of testing, both for control of materials and for rapidly assessing the properties of a particular component or modification of a component, are outlined. The various test methods available for control and selective testing are also considered, together with the larger-scale mechanical tests required to assess the properties of a selected type of laminate in a structure.

The design of test pieces for mechanical testing is discussed. An attempt has been made to indicate possible ways of standardizing the presentation of data and other factors which would allow an easier selection of the best materials to produce a laminate of suitable quality for a particular purpose to be made.

The sources of variability in the properties of laminates are considered and suggestions made for their correction.

Epoxide Resin/Glass Laminates

by W. J. Marmion, B.A., Plastics and Resins Department, Shell Chemicals, Ltd.
June 9, afternoon

THE chemical nature of epoxide resins is outlined and a review is given of the various curing agents which may be used with them in laminating systems. The principal curing agents are amines, certain amine derivatives, acid anhydrides and a limited number of phenolic resins—the mechanism of their action and the end properties they confer are described. Cure can also be carried out with some polyamide and polysulphide resins and this method of conversion is of interest where a laminate with a greater degree of flexibility is required.

The handling properties of the liquid epoxide resins can be improved by the addition of reactive diluents. Details are given of a number of materials which can be used for this purpose.

The most widely used reinforcing materials are glass roving and woven glass cloth—a limited evaluation has been made of different types of glass mat.

The techniques for using epoxide resins in wet-lay-up and dry-lay-up processes are described. With the exception of the phenolic modified system no volatiles are evolved during the curing process and this may, therefore, be carried out at low pressures. The curing temperatures required depend on the particular curing agent selected and can therefore vary over a wide range.

The physical and chemical properties of epoxide laminates are described in detail. The best high-temperature performance is shown by the phenolic/epoxide system, and the best chemical resistance by the meta-phenylene diamine cured resins; the results of 180-day chemical resistance tests are presented.

One of the principal applications for the laminates is in the field of chemically resistant piping and equipment. Other important applications include miscellaneous structural uses—particularly in the aircraft industry—and a considerable number of electrical uses.

CONVENTION PROGRAMME AND SUMMARIES

British Industries Fair Reviewed

A RECORD OF EXHIBITS AT CASTLE BROMWICH, BIRMINGHAM, AND OLYMPIA, LONDON

THIS year's British Industries Fair, the first under private enterprise, has once again provided a review of the quality, and leadership of Great Britain in many industrial fields. The importance of maintaining this position against ever-increasing overseas competition cannot be over emphasized and manufacturers, realizing this, have given of their best. From this year's Fair it was evident that the old conservatism for which this country was so well known, the reluctance to accept new ideas, materials and techniques, and the unwillingness to experiment on new designs, are things of the past, and with research progressing, as it is, far ahead of actual production, our future position if not unchallenged at least appears secure.

Castle Bromwich

Advances and improvements in design and performance were the notable features in many sections at Castle Bromwich. Few of them were spectacular and many indeed would go unnoticed except by the purchaser but, nevertheless, they had been made. In the use of plastics materials, p.t.f.e. for seals, gaskets and other engineering applications is more widespread, in spite of the additional cost, than ever before; rigid p.v.c. for chemical plant and fume ducting is being used extensively; and synthetic resins in combination with mould sand are firmly established for foundry and shell moulding.

Olympia

Olympia, where consumer goods were displayed, provided a more obvious outlet for the advance in design which is now taking place. Toys and textiles, scientific instruments and musical instruments, cutlery and clocks all proved a happy hunting ground for the designers. Novelty with functionality was the key and with the more extensive use of colours it provided a worthy testimonial to the effect that Gt. Britain is no laggard in the design field. The use of plastics has solved many problems for the designer besides providing him with a material that will combine colour and utility. The more obvious examples of this were in the fancy goods and toy sections whose very life blood is novelty and colour.

B.I.F. 1956

So much for the B.I.F. that has passed, but what of 1956? Arrangements have been made to hold the Fair at two different times next year. The consumer goods section, which includes toys, textiles, fancy goods, jewellery, and sports goods, whose main selling season is in the spring, will next year be exhibiting at Earls Court in February. Olympia and Castle Bromwich will open as usual in May for the other industries although the new arrangements may necessitate a redistribution of exhibitors between the two places.

BIRMINGHAM—CASTLE BROMWICH

Rockwell Hardness Tester. Although not designed specifically for the testing of plastics material this machine will do the job successfully with a load of 40 and 60 k.g.m.

George H. Alexander Machinery Ltd., Coleshill Street, Birmingham, 4.

Testing Machinery. The new Avery power-operated tensile testing machine was the principal exhibit on their stand of interest to the plastics industry. This machine has a maximum load of 2,500 lb. but by the use of a capacity change-wheel the figures on the indicator chart can be changed for maximums of 1,250 lb. and 500 lb., while the divisions between the figures remain the same. Load pacing gear is a standard fitting and an autographic recorder can also be fitted if it is required. Other exhibits were counting, weighing, and measuring machinery.

W. and T. Avery Ltd., Soho Foundry, Birmingham, 40.

Process Timers. Time delays, process timers and thickness gauges were among the components offered by Rotherham and Sons Ltd. Other products on show included instrument parts and gauge movements and other fine engineering components.

Rotherham and Sons Ltd., Spon Street, Coventry.

Disintegrators and Hammer Mills. A selection of disintegrators, pulverizers and hammer mills suitable for the grinding of plastics materials and chemicals was shown by Christy and Norris Ltd.

Christy and Norris Ltd., Broomfield Road Chelmsford, Essex.

Air Compressor and Spraying Equipment. Air compressors, of the conventional piston type and also of the diaphragm type, were open for inspection on the stand of Dawson, McDonald and Dawson Ltd. The Compton diaphragm type has been designed for use where an absolutely oil-free air supply is essential. On the spraying equipment side both portable and stationary units capable of operating several guns were on view.

Dawson, McDonald and Dawson Ltd., Compton Works, Ashbourne, Derbyshire.

Perspex Plating Barrels. Plating barrels made from Perspex either being of the single barrel or multiple barrel design were exhibited by the Electro Chemical Engineering Co., Ltd.

Electro Chemical Engineering Co., Ltd., 161 Queens Road, Weybridge, Surrey.

The stand of United Ebonite and Lorival Ltd. at Castle Bromwich.

Moulds and Tools. The Gauge and Toolmakers' Association combined the products of 50 members on one stand. It was evident that the plastics industry is well served by the members of this Association, if the quality and precision of the moulds and tools exhibited were indications of the standards that can be expected from them. It would be unworthy to mention individual companies in such an outstanding display.
The Gauge and Toolmakers' Association, Standbrook House, 2-5 Old Bond Street, London, W.1.

Presses and Hydraulic Equipment. Finney Presses Ltd. showed a 50-ton downstroking prefilling hydraulic press on their stand. The press had a platen area of 14 in. by 14 in., daylight of 18 in., and stroke of 8 in. The working pressure is 2,240 p.s.i. The power unit consists of a tandem S-type pump unit driven directly from a 1½ h.p. motor, coupled to a 4-gallon nominal capacity Greev Mercier Hydro-pneumatic accumulator, the combined capacity being capable of cycling the press once every minute. The speeds of operation are fully adjustable from zero to 2 in. per sec, both for pressing and return.
Finney Presses Ltd., Berkley Street, Birmingham, 1.

Electroplating Machinery. The latest Rotomatic plating machine incorporates the new "Pilgrim Step" movement whereby the work travels forward 2 ft. and back 1 ft. This sequence takes place in the same time as the normal 1-ft. forward movement and is a great advantage in producing quality plating. Submerged barrel-plating machines of the Hymax and Minik types, both having high output rates, and the Typhoon plating barrels were also being exhibited.
W. Canning and Co., Ltd., Great Hampton Street, Birmingham, 18.

High-frequency Pre-heater. A radio-frequency pre-heater for thermosetting moulding material with an output of 3½ kW. which it is claimed is sufficient to plasticize 2½ lb. of moulding powder per minute, was shown by E.M.I. The pre-heater is fitted with two timing units to enable it to be used with two presses requiring different pre-heat times.
E.M.I. Electronics Ltd., Hayes, Middlesex.

Machining and Diesinking. Examples of intricate machining and diesinking on moulding tools showed some of the work being done by H. B. Sale, Ltd., who are specialists in this field.
H. B. Sale Ltd., Progress Works, Summer Lane, Birmingham, 19.

Mould Steels. Steels specially treated for the making of injection or compression moulding tools were displayed by Richard W. Carr and Co., Ltd. An example of a mould made from this steel was shown.
Richard W. Carr and Co., Ltd., Pluto Works, Wadsley Bridge. Sheffield.

Electro-Chemical Deposition. To illustrate the many applications for their process of electro-deposition of metals for the prevention of corrosion and wear, Fescol Ltd. used a series of slides and pictures thrown up on a large screen. Of particular interest to moulders was a comparison between a treated and untreated hydraulic ram, an example of each being shown.
Fescol Ltd., North Road, London, N.7.

Electric Motors and Ancillary Equipment. Claiming to be the first producers in the world to be able to deliver from stock electric motors to American N.E.M.A., 1954 dimensions, English Electric included some of these together with motors conforming to British Standard dimensions on their stand.
The English Electric Co., Ltd., Marconi House, Strand, London, W.C.2.

Resins for Industry. The B.R.P. display was divided into two main sections, foundry resins of the urea or phenolic type, and, polyester resins for use with glass fibre. Of the first type numerous moulds demonstating the shell strength and mould detail obtainable by using these resins were displayed with a range of castings in various metals obtained from them. The polyester/glass fibre structures exhibited included a 15-ft. fume stack and a luggage locker recently introduced for the Morris Minor.
British Resin Products Ltd., Devonshire House, Piccadilly, London, W.1.

Synthetic Lacquers. A variety of synthetic resin lacquers for industrial purposes have been developed by Cellon Ltd. These include the Cerrux industrial finishes based on the latest epoxy and vinyl resins, which have been developed specifically to resist attack by corrosive chemicals, solvents, alkalis and detergents, on domestic washing machines, refrigerators and water heaters. One of the latest additions to their range of these resins is the Birlon temporary protective for polished surfaces. More specialized lacquers designed for use with vacuum-plated plastic materials were also on display. These consisted of a sealing coat and also a water-white protective coating.
Cellon Ltd., 380 Richmond Road, Kingston-on-Thames, Surrey.

Protective Coating. Resin based on ethyl cellulose used for a protective coating for steel tools and components was being demonstrated on the Croda Ltd., stand.

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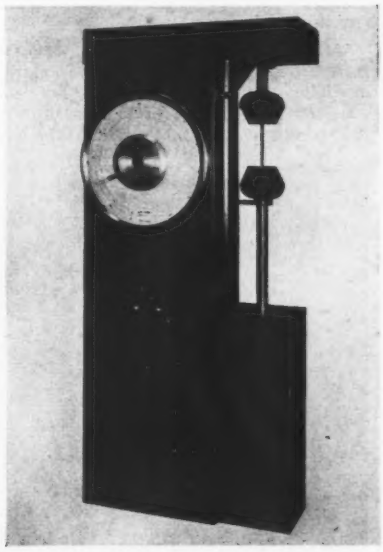
Croda Ltd., Croda House, Snaith, Nr. Goole, Yorkshire.

Glass Fibre/Resin Jigs. Drilling and polishing jigs for the aircraft industry made from glass fibre/polyester resin laminates



Avery tensile testing machine.

Bakelite Ltd. stand, with Latymer vacuum-forming machine in foreground.

and an impeller fan and casing in the same material were exhibited by Hordern Richmond (Sales) Ltd. Other jigs and tools were made from Hy-du-lignum compressed wood laminate.

Hordern Richmond (Sales) Ltd., Hy-du-lignum Works, Hadenham, Bucks.

Industrial Containers. Although the stand of Marston Excelsior Ltd., was mainly

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devoted to the use of aluminium alloy for the chemical and oil refining industries, they included a display of laminated plastics and plastic containers designed for a variety of industrial applications.

Marston Excelsior Ltd., Fordhouses, Wolverhampton.

Custom Mouldings in Plastics Materials. A representative selection of many plastics mouldings in various materials not only provided an indication of the versatility of the company but also the innumerable applications to which plastics are entirely suited. One of these was a thermoplastic cabinet for one of the new clock radios, another a large phenolic moulding which carried the fuses for a circuit breaker. Other mouldings were in alkyd material, nylon, polystyrene, p.v.c. and polythene. Pre-form mouldings in resin/glass laminates, extruded rod, strip and tubes in p.v.c., and extruded polystyrene completed the display.

National Plastics (Sales), Ltd., Avenue Works, Walthamstow Avenue, London, E.4.

Plastics Raw Materials. The Plastics Division of I.C.I., chose for their theme "Plastics for the Moulder." They showed the extensive range of compression and injection moulding materials which the Division manufactures.

Particular emphasis was given to the wide range of Mouldrite nylon moulding powders and compounds. Space was also devoted to "Alkathene" brand of polythene, "Fluon" p.t.f.e., "Diakon" acrylic moulding powders and the UF and PF range of thermosetting moulding powders.

Imperial Chemical Industries Ltd., Plastics Division, Black Fan Road, Welwyn Garden City, Herts.

Chemical plant by Prodorite Ltd.

Plastic Mouldings for Industry. United Ebonite and Lorival Ltd., contrasted a group of injection mouldings in p.v.c., polythene, acetate and polystyrene with compression mouldings in urea and phenol formaldehyde. In the extrusion section, thin-walled extruded tubes, rigid tubes, rods and sections were shown with calendered p.v.c. sheet, for packaging, linings and electrical insulation.

United Ebonite and Lorival Ltd., Little Lever, Nr. Bolton.

Plastics for Industry. To display the many uses of plastics in industry was the theme of the Bakelite stand. The materials shown included both thermosetting and thermoplastics moulding materials, laminates, extrusion compounds, resins and adhesives. Features of special interest were: Vybak rigid p.v.c. sheet for vacuum-forming articles being demonstrated on a new automatic vacuum-forming machine made by Latymer Engineering Co., Barnes, London, which is being shown for the first time; telephones and electrical components moulded from Bakelite alkyd materials; a variety of articles fabricated from Bakelite polyester and epoxy resins reinforced with glass fibres, including the float of a catamaran.

Bakelite Ltd., 12-18 Grosvenor Gardens, London, S.W.1.

Acetate Sheeting for Vacuum Forming. Cellastine acetate sheeting, which has been used successfully for both press forming and for vacuum forming, has been further improved to give better deep-drawing qualities. The new type of sheeting was displayed for the first time on the stand of British Celanese Ltd. Transparent acetate wrapping film and window film, both in its natural state and laminated to metal foil together with Cellastine acetate sheeting which is being used by optical manufacturers for spectacle frames, completed the exhibits on this stand.

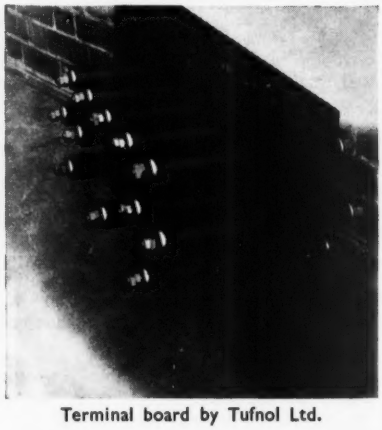
British Celanese Ltd., Celanese House, Hanover Square, London, W.1.

Plastics Piping. Shires and Co. (London), Ltd., one of the pioneers in the use of polythene piping for plumbing, showed, in addition to piping in all sizes up to 12 in. diameter, the Kingfisher syphon flush unit moulded in polythene. In addition they showed reverse moulded cisterns and an array of plastic w.c. seats, cistern floats and other components manufactured by them for domestic use.

Shires and Co. (London), Ltd., Greenbottom Works, Guiseley, Yorkshire.

Plastics Domestic Ware. Several new items have been added to the Gold Seal Ekco range of domestic ware. These include a bucket, dog bowls, washing-up bowls, colanders, sink tidies and a baby's bath all moulded in polythene. In addition there was on show the Handicaddy, details of which appeared in "New Productions," May issue. On the industrial side, the popular range of Ekco polythene bottles were exhibited in a variety of different colours.

E. K. Cole Ltd., Southend, Essex.



Terminal board by Tufnol Ltd.

Extruded Tubing. Although their main interest is in the drawing of copper, brass and non-ferrous alloy tubing, the Yorkshire Copper Works, Ltd., nevertheless, produces a large range of tubes in polythene, p.v.c., and polystyrene, under the trade name of Polyore.
The Yorkshire Copper Works Ltd., Leeds.

Glass Fibre and Mat. Car and bus panels, helmets, cases and a washing machine tub provided examples of the use of glass fibre in the form of rovings and of mat. Combined with epoxy and polyester resins it has proved to have many advantages as a structural material.
Fibreglass Ltd., Ravenhead, St. Helens, Lancs.

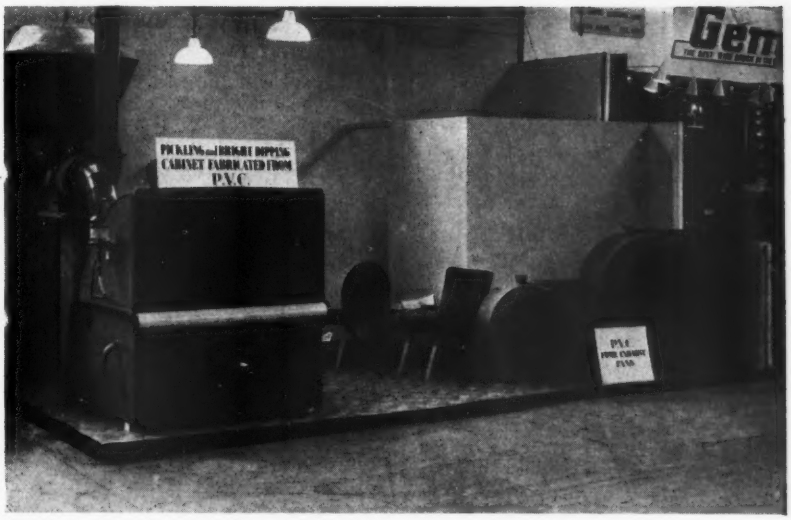
Glass Fibre Ducting. Fume and acid resistant ducting in glass reinforced plastics and p.v.c., and also a polythene conduit junction were displayed to illustrate the "acid proofing" service given by Prodorite Ltd.
Prodorite Ltd., Eagle Works, Wednesbury, Staffs.

Fume Ducting. The construction of ducting for the extraction of corrosive chemical fumes is the specialized work of Plastic Constructions Ltd. Examples of ducting of various sizes and shape fabricated from rigid p.v.c., gas welded at the joints, and fans, tank linings and pipes in the same material, provided a solution to this problem. Also on show was a self-contained pickling and bright-dipping unit made from p.v.c.
Plastic Constructions Ltd., 37 Weatheroak Road, Sparkhill, Birmingham, 11.

Nylon for Engineering. Plastics Engineers, Ltd., convinced that nylon has a definite future in the engineering industry displayed some of the many components which they have already supplied. These included bearings, gear wheels, pulleys, washers and oil seals and emphasized the experience this company has in this particular field.
Plastic Engineers Ltd., Treforest, Glamorgan

Nylon Gears. The gear division of George Angus and Co., Ltd., in addition to a display of machine-cut metallic gears, had a small, but interesting, selection of moulded and machine-cut nylon gears. Their interest in plastics materials was further emphasized by the fluorcarbon plastics and synthetic rubbers for sealing units.
George Angus and Co., Ltd., 153/158 Westgate Road, Newcastle upon Tyne, 1.

E.M.I. pre-heating unit.



Fume ducting on the stand of Plastic Constructions Ltd.

Cushioned Nylon Washer. In 1946 the Supatap appeared on the domestic market as the first tap in which the washer could be replaced without turning off the mains. Latest innovation is now a cushioned nylon washer. The cushioning is supplied by rubber and the nylon provides a hard-wearing surface. It is claimed that these washers have five times the life of the normal washer.
F. H. Bourne and Co. (Engineers) Ltd., Manor Royal, Crawley, Sussex.

Nylon/Leather Belting. Two grades of Meteor transmission belting were being demonstrated on the Stephens Belting Co., Ltd., stand. This belting has a nylon core in either a fabric or extruded strip and chrome leather facing with leather or fabric back.
Stephens Belting Co., Ltd., Snow Hill, Birmingham, 4.

Laminate On-load Tap Changer. The principal exhibit of the Permali, Ltd. stand was a 33 kV. 400 amp. on-load tap changer fitted with laminate mounting panels and Dialam (an impregnated paper) bushings. On other sections of the stand were displays showing the use of laminated materials in overhead transmission lines, railway signalling equipment, electrical plant and equipment, engineering parts and chemical plant. All three grades of laminate were shown, the E.H. for normal H.T. and L.T. electrical and mechanical use, the T.H. special grade for tropical and high humidity applications, and the B.H. special chemical resisting grade.
Permali, Ltd., 125 Bristol Road, Gloucester.

Valves. Diaphragm valves for acids, alkalis, etc., lined with polythene and p.v.c. were displayed by Wynn (Valves) Ltd. The resistance to corrosive attack by p.v.c. and polythene combined with the rigidity of the metal alloy valve body go a long way to solving one of the many problems in handling corrosive liquids.
Wynn (Valves) Ltd., Argyle Street, Wrexham, Denbighshire.

Industrial Gloves. Leather, cotton and p.v.c. and asbestos were the materials used in the manufacture of the gloves displayed by Tedson, Thornley and Co., Ltd.
Tedson, Thornley and Co., Ltd., Robert St. Mills, Rochdale, Lancs.

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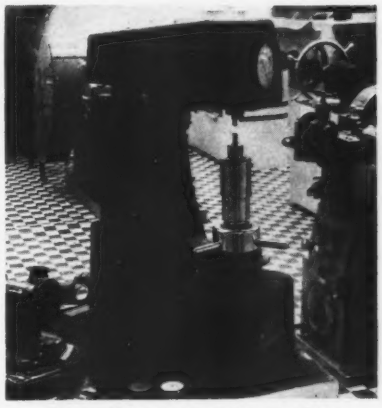
Door Furniture. Attractively engraved Perspex door pulls, cabinet handles and finger plates, the recesses filled with colouring compound giving a 3-D effect, provided one of the novelties of the Birmingham section of the B.I.F.
Plastocraft Products (Darwen) Ltd., Spenbro Works, Bolton Road, Darwen.



Rockwell hardness testing machine.

Plastics Kitchen and Domestic ware.

Plastics Kitchenware. Well known in most households is Bex kitchenware. Its extent can only be realised when the full range is on view as it was at Castle Bromwich. Moulded in polystyrene, polythene and melamine, each article has a label attached to it naming the material from which it has been made and advising the purchaser on its limitations and advantages.
Halex (A division of the British Xylonite Co., Ltd.), Higham's Park, London, E.4.

Plastics for the Catering Trade. A large selection of Perspex trays and food covers designed for use in the catering trade, provided the main theme at the stand of Phipps Plastic Products Ltd. Also fabricated from Perspex were a bath tray, tumbler and tooth brush holder, and lamp shades.
Phipps Plastic Products Ltd., 244 Bromford Lane, West Bromwich, Staffs.

Bottle Caps and Handles. Mouldings for the trade in plastics materials were displayed on the stand of Empire Plastics (Birmingham), Ltd. These included bottle caps and door handles in a variety of designs.
Empire Plastics (Birmingham) Ltd., Bructon Street, Birmingham, 4.

Seals and Packings. Hydraulic seals and packings fabricated from p.t.f.e., were included in the display of Lion brand seals.
James Walker and Co., Ltd., Lion Works, Woking, Surrey.

Supplies for the Builder. Everite plastics builders hardware was included among the many examples of plastics materials now being used in the home. Other examples were Everex plastics tubing, Everoc compression joints and plastics knobs and handles.
Evered and Co., Ltd., Surrey Works, Lewisham Road, Smethwick, 40, Staffs.

Ropes from Synthetic Fibres. Ropes, nets and cordage made from Terylene and nylon gave some indication of the popularity of these materials in an application which severely tries any fibre. In addition p.v.c.-coated cloths for hatch-covers and general use as tarpaulins were exhibited.
The Gourock Ropework Co., Ltd., 92 Bay Street, Port Glasgow.

Laminates for Electrical Installation. Exhibited on the stand of Tufnol, Ltd., were samples of laminated sheet tube and rod

Displaying nylon for engineering.

and an interesting display of components moulded to specification or machined from the basic forms with the usual engineering tools. The machinability of Tufnol was being demonstrated on a lathe on the stand. Particular exhibits of interest were an electrical terminal board made from laminate sheet with bushes and sleeves of laminate tube, and, components of a saline pump used in oil wells. Other applications shown included gear wheels, jigs, pulleys, bearings, coil formers and marine fittings.
Tufnol Ltd., Perry Barr, Birmingham, 22B.

Fabrication of p.v.c. As well as the many applications for rubber on view on the Dunlop stand there were also goods made from p.v.c. and p.t.f.e. compounds.
Dunlop Rubber Co., Ltd., Cambridge Street, Manchester, 1.

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Industrial Gloves. Gloves made by the dipping process in p.v.c., with fabric linings in a variety of grades and thicknesses designed for different industries provided the main display of James North Export Ltd. Also on show were Strongoflex protective clothing and Northproof foul-weather p.v.c. clothing, the latter having the advantage of not becoming tacky in use or storage.
James North Export Ltd., Kirkman House, 54a Tottenham Court Road, London, W.1.

Shell Moulding Resin Sand. Dohmcraft foundry sand and shell moulds made from it were displayed on the stand of Dohm Ltd.

Psychological toys in plastics.

These compounds are a zircon or silica sand with a phenolic resin binder and offer considerable advantages in foundry and shell moulding.
Mellor Mineral Mills Ltd., Etruria Vale, Stoke-on-Trent.

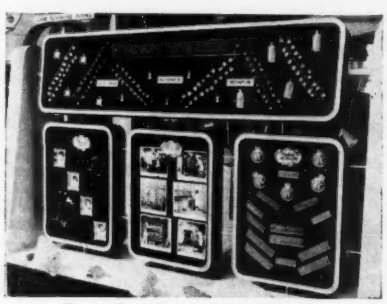
Cellular Polystyrene. Jablo Plastics Industries Ltd. introduced Jablite cellular polystyrene for low-temperature insulation. With a density of 2 lb. per cu. ft., and a thermal conductivity of 0.17 B.Th.U.s at low temperature, it provides an admirable insulant for cold stores, transit containers and refrigerated vehicles.

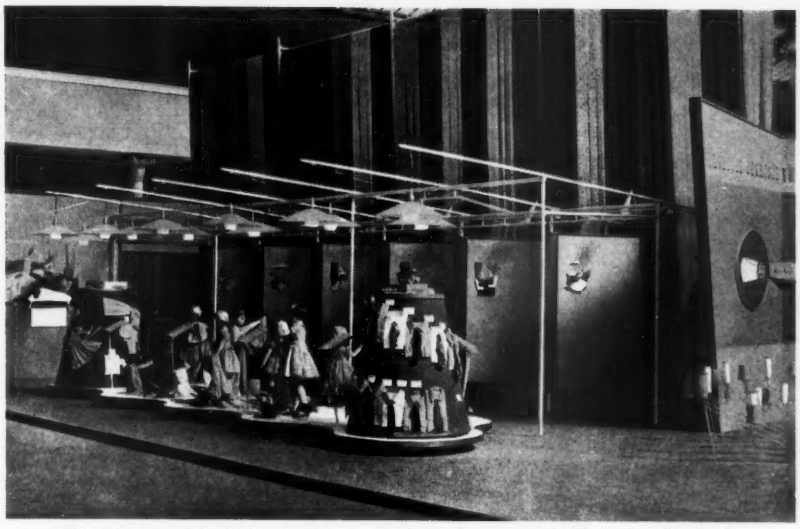
Polyurethane Foam. Jablon and Polyurethane foam for upholstery, mattresses, sponges and protective pads was exhibited in a variety of textures and colours.

Cellular P.v.c. Aero Jablex, a cellular p.v.c. has the advantage of being sufficiently rigid in form to enable insulated containers to be constructed wholly from this material. Although a rigid material it has sufficient resilience to withstand shock without damaging.
Jablo Plastics Industries, Mill Lane, Waddon, Croydon, Surrey.

P.V.C. Sheeting. Plain, printed, embossed and laminated p.v.c. sheeting in a variety of gauges, and samples illustrating the many end products for which Duvina sheeting is used made up the general scheme of the Dunlop Special Products Ltd. stand. One of the latest applications for it is as a road-marking material for pedestrian crossings.
Dunlop Special Products Ltd., (Plastics Division), Fort Dunlop, Erdington, Birmingham, 24.

Bag-making Machinery. Machinery designed for the packaging of a variety of substances in acetate film, machinery for the automatic printing and forming of polythene sheet into bags with a delivery rate of 60/80 per minute and photo-electric cell registration of printing and, in fact, machinery for the packaging industry as a whole could


Examples of vacuum metallizing.



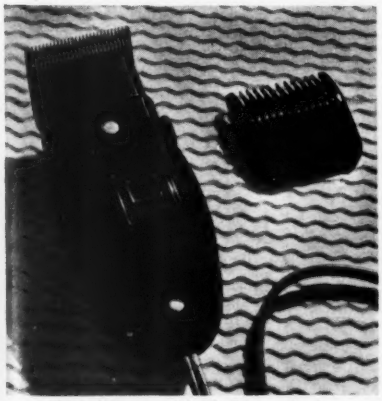
The I.C.I. stand displaying products made from the man-made fibres they featured.

have been seen on the stand of Rose Brothers (Gainsborough) Ltd.
Rose Brothers (Gainsborough) Ltd., Albion Works, Gainsborough, Lincolnshire.

Portable Hardness Tester. The Indentometer has been developed to meet the demand for a portable and accurate testing instrument. Loads are instantly variable by turning a hand wheel and are applied by means of a hydraulic pressure assembly consisting of a diaphragm unit coupled to a finely calibrated dial pressure gauge mounted on the instrument. The depth of impression is measured by a lever mechanism coupled to a hardness recording dial. The weight of the Indentometer without case is 18 lb.
C. Tennant, Sons and Co., Ltd., 4 Copthall Avenue, London, E.C.2.

Polythene Tubing. Polythene tubing for plumbing, agriculture, and chemical piping in standard and heavy gauges and illustrations of its use gave a further indication of the wide interests of this company.
Dohm Ltd., 167 Victoria Street, London, S.W.1.

Window Stickers. Self-adhesive window advertising posters printed on p.v.c. sheet have the advantage of durability even in exposed positions, and cleanliness. Upon removal no glue marks are left and they can be instantly re-affixed on any dust-free and smooth surface. Different shapes, colours and motifs were exhibited on the stand of Zell-Em Ltd.
Zell-Em Ltd., Wren Grove, Preston Old Road, Blackpool.



Hair-clippers with black urea body.

Vinyl Carpeting. Felt-based vinyl carpeting in varied colours and having plain and embossed designs on the surface, produced both for the home and for use in cars, was displayed on two stands.
The Adamite Co., Ltd., Mansfield House, Strand, London, W.C.2.
Hardura Ltd., St. Lawrence Mill, Gt. Harwood, Lancashire.

Glass-fibre Buoy. Glass-reinforced plastics are established as construction materials in the boat and yacht building world. A further application, a channel marker buoy, now in production by Goshawk Shipyards Ltd., was on show for the first time on their stand. The shell sections are made from glass-fibre mat bonded with polyester resin integrally attached to the framing members. The advantages of using glass-reinforced plastics are a considerable saving in weight, no fouling by marine growth and permanent colouring.
Goshawk Shipyards Ltd., Trinity Road, East Cowes, Isle of Wight.

Electric Shavers. In addition to the Buk and Kub, dry shavers, Chilton Electric Products showed an electric hair-clipper designed for use in the home. The body of the clippers is moulded in black urea.
Chilton Electric Products Ltd., Hungerford, Berks.

Plastics Collars and Cuffs. Collars, cuffs and other accessories which become soiled easily are now being made from plastics. The advantages of sponging a soup stain off your short front with a damp cloth needs no extolling.
H. R. Denne, 30 Whitepost Lane, London, E.9.

Plastics Lampshades. Regular readers will be familiar with the Rotaflex lampshades, a description of their manufacture appearing in the April issue. It is only necessary, therefore, to mention that the variety of designs and colour combinations has increased even further, evidence of this being on their stand.
Rotaflex (Gt. Britain) Ltd., 90 Regency Street, London, S.W.1.

Picnic Ware. One of the first uses of melamine and urea cups, saucers and plates was in that summer favourite, the picnic hamper. Their continued use and the addition now of sandwich boxes and other necessary containers in plastics are a gratifying testimonial of their success. A large selection of fully equipped hampers, cases and baskets was on view on the stand of G. W. Scott and Sons.
G. W. Scott and Sons, 4 Tower Street, Cambridge Circus, London, W.C.2.

Household and Domestic Ware. The continued and increasing use of plastics in kitchenware has provided considerable scope in the redesigning of established articles and the manufacture of new domestic inventions. This was exemplified by the products exhibited on the stand of Mendle Brothers Ltd., who have specialized in this market.
Mendle Brothers Ltd., Station Terrace, Pontygwaith, Rhondda, Glamorgan.

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Man-made Fibres. Fabrics, clothes and goods made from Terylene and Ardil fibres, together with illustrations of their use in industry, was the theme of the I.C.I. stand. Lengths of material made from these fibres provided a pleasant background to the smaller exhibits.
I.C.I. Ltd., Imperial Chemical House, Millbank, London, S.W.1.

Glass-fibre channel marker buoy.

Replica Advertising Models. Small replica working models of cars and trucks are finding a ready market in both the advertising and toy fields. Extensive use of injection-moulded parts in these models besides reducing manufacturing difficulties has enabled a more faithful reproduction of detail to be obtained.

Victory Industries (Surrey) Ltd., Barfax Works, Worplesdon Road. Guildford, Surrey.

Metallized Plastics. Another service offered by the Dohm group of companies is vacuum metallizing and several examples of metallized plastics were displayed for the appraisal of the visitor.

A.E.R. (1938) Ltd., 196 Great Cambridge Road, Enfield, Middlesex.

For My Lady. Fashion Jewellery, manicure sets, compacts, hairslides and 101 other articles (in plastics) so dear to the hearts of the ladies, will always make the stands of Scintellex and Thurgar Bollé (Successors) Ltd., of interest. This year, variety of design and colour provided a glittering display for even the casual observer.

Scintellex, 34 Purewell, Christchurch, Hants.
Thurgar Bollé (Successors) Ltd., Orient House, Church Way, Wellingborough, Northants.

Printed P.V.C. Fabrics. Well known for their Li-Lo products and also in the plastics industry as moulders and fabricators, P. B. Cow and Co., Ltd., with their subsidiary London Moulders (Plastics) Ltd., exhibited mouldings in thermoplastic and thermosetting materials in addition to p.v.c. fabrics and articles made up from this material.

P. B. Cow and Co., Ltd., 12 Hay Hill, Berkeley Square, London, W.1.

Toilet Bags and Holdalls. Attractively printed p.v.c. sheeting made up into toilet bags and toilet holdalls of various designs were being exhibited by Heléna Products

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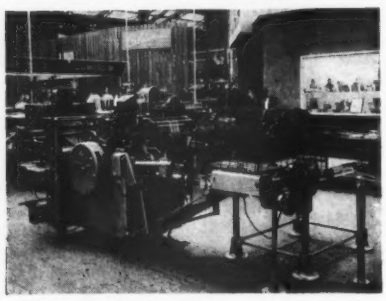
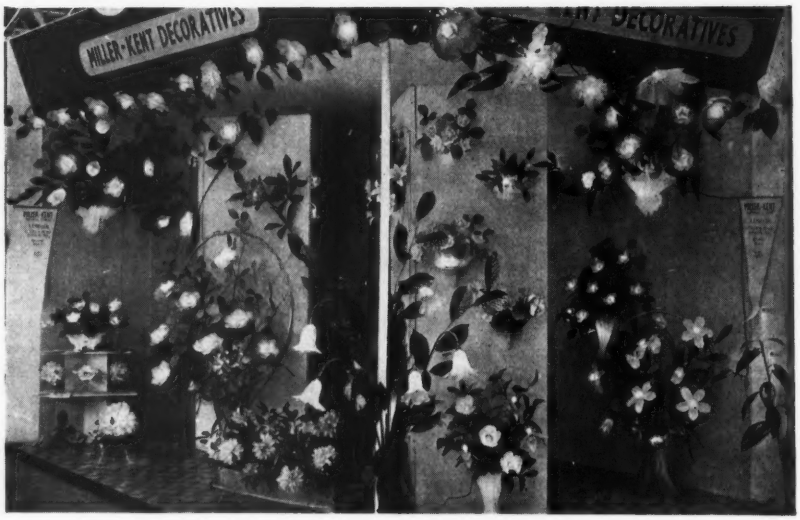
Ltd. Some of the designs were made up of two layers of sheeting with quilting between giving an attractive appearance and a pleasant feel to the bag.

Heléna Products Ltd., Heléna Building, 86-92 High Road, New Southgate, London, N.11.



Polythene bag-making machine.



Cellulose acetate artificial flowers make a colourful and attractive stand.

Permanent Flowers. Providing a splash of colour even amongst the highly decorated stands of the B.I.F., the Miller-Kent permanent flowers attracted much attention. These flowers, which are formed from cellulose acetate, closely resemble their natural counterpart, the illusion being further enhanced by the foliage, which in both colour and form is an exact copy.

Miller-Kent, Decoratives, London Studios, 56 Half Moon Lane, London, S.E.24.

Metallized Mouldings. Novelty egg-timers were the principal exhibits on the stand of Cassidy Brothers. Moulded in tools made in their own tool room and metallized in their own plant, even making their own sand glasses, these could have truly (and creditably been labelled "All Our Own Work." Also on their stand were trade mouldings in different materials, sun-glasses and other novelties.

Cassidy Brothers, Casdon Works, Maltby Place, Newhouse Road, Marton, Blackpool.

Combs and Sun-glasses. Combs of all shapes, sizes and colours comprised the range of Barnet combs displayed for the potential buyer on the stand of E. R. Holloway Ltd. Additional attractions included manicure and vanity sets in p.v.c. cases, and sun-glasses.

E. R. Holloway Ltd., 17 Bessemer Road, Welwyn Garden City, Herts.

Musical Toys. Hand-bells, trumpets, trombones, saxophones, and clarinets provide the ingredients for a "musical" playtime. Moulded in polystyrene and then metallized, these toys have the appearance of real instruments as well as the advantage of producing several notes. Selcol Products Ltd., are the manufacturers and also of the ukuleles, mouth organs and fancy goods which were displayed on their stand.

Selcol Products Ltd., 114-116 Charing Cross Road, London, W.C.2.

Psychology Toys. Plastic toys designed to be a continual source of amusement for young children is the aim of Dandy Toys Ltd. Moulded in both thermosetting and thermoplastic materials they provide a colourful and hygienic assortment for the retail trade to consider.

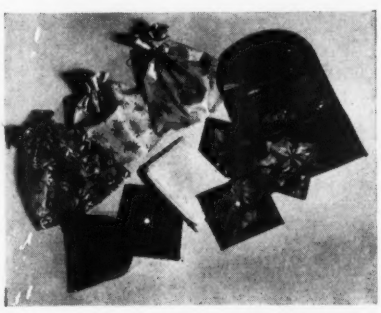
Dandy Toys Ltd., 49b South End, Croydon, Surrey.

Plastics Toys. Variety of shape, variety of colour, variety of use and variety of materials could describe the toy section of the B.I.F. Toys made from nylon fur, toys made from acetate polystyrene, p.v.c. and a host of other materials too numerous to mention, made up a section which attracted considerable attention. Ingenuity of design and the use of suitable materials were the outstanding features of the displays.

The official stands of Hong-Kong and Northern Ireland both had plastics toys among their exhibits, evidence of thriving industries in these places.

Toy Tea Sets. Two new toy tea sets, additions to the large range of plastics products manufactured by Seaforth, were on show at Olympia. Other newcomers were the newly designed flower pots and horticultural bowls. Household and domestic ware, fancy goods, and smokers' sundries completed the extensive range of nearly 200 products.

Seaforth Plastic Mouldings, Watchett Works, Oakhurst Road, Southend-on-Sea, Essex.

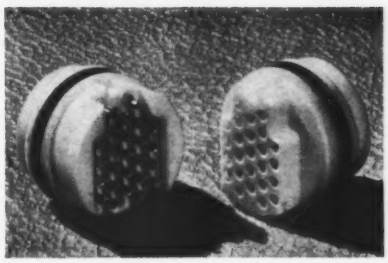


Toilet wallets in printed p.v.c.

Moulding and Fabricating with P.T.F.E.

Evaporating dish fabricated from p.t.f.e.

With its remarkable properties and despite its high cost p.t.f.e. has proved invaluable in specialized applications. To exploit these properties however, it has been necessary to evolve new methods of fabrication and moulding.



A moulded radio component in p.t.f.e.

THE history of polytetrafluoroethylene in comparison to many plastics materials is still very short and in fact, even today, eight or nine years after its introduction on anything like a commercial scale, its use in industry, with the exception of a few applications, is still in the experimental or prototype development stage. The material itself has properties which make it unique and of great value in specialist applications. For electrical purposes its insulating properties are exceptional. Chemically, the only agents which affect it at all are some highly fluorinated oils, molten alkali metals, chlorine trifluoride and gaseous fluorine at elevated temperatures. But perhaps its most extraordinary property is its low coefficient of friction, which under some test conditions has been reported as low as 0.02. However, without stability over a reasonable range of temperatures the value of these properties would be limited, and as p.t.f.e. is generally classified as a thermoplastic, one assumes (wrongly in this case) that working temperatures should not exceed 100° C., or thereabouts. This is wholly wrong and temperatures of 300° C. can be experienced with no deterioration in properties. For low temperature work p.t.f.e. is still flexible at −100° C., and reports from the U.S.A. say that it does not exhibit brittle characteristics at temperatures of −269° C.

Chemical Structure

Let us now consider the accepted chemical structure and the production of the molecule which provides these remarkable properties. Polytetrafluoroethylene is a true fluorocarbon, that is to say only two chemical elements, fluorine and carbon, make up the molecular structure. The bond between these two elements is exceedingly strong, with a comparatively weak secondary valence force. Combine this with the fact that the fluorine atom is approximately 2½ times as large as the hydrogen atom and it will be apparent that the carbon molecule is, in fact, "sheathed" by the fluorine, which provides a strong armour against any effort to attack the carbon, which is the weaker element. The length of the molecular chain has not been definitely established, but is of a very high order.

The monomer, tetrafluoroethylene, which is an odourless gas, is produced by the reaction of anhydrous fluoric acid and chloroform, the resulting gas, difluoromonochloromethane, being pyrolized to produce the monomer. Polymerization of this gas after fractionating is done under pressure, using an aqueous solution of ammonium persulphate as the catalyst. The reaction is exothermic and needs careful control.

The behaviour of p.t.f.e. at temperatures above its so-called melting point is of interest particularly to the fabricator and moulder. Its classification as a thermoplastic is, strictly speaking, erroneous in so far as at no stage does it develop a plastic flow, as that term is generally understood, although its make-up is of the long chain molecule type. The melting point of its crystalline structure is in the region of 327° C., and represents its transition to an amorphous gel readily observed by the change in appearance from a white opaque solid to a transparent rubber-like jelly, and it is at this stage that it can be formed. Its lack of flow is attributed to the very high molecular weight of the chain. This has presented a problem in the forming of p.t.f.e. Obviously the techniques of injection and transfer moulding would be unsuitable and compression moulding would need considerable amendment before being used for p.t.f.e.

Moulding

Experiments and investigations have, therefore, been towards developing new techniques. In this country most success has been achieved by a direct pressure moulding of a heated preform in a positive mould, and in this way quite intricate and substantial mouldings have been made. The nature of p.t.f.e. lends itself to the making of preforms, the small particles having fibrous tentacles which under pressure bind the powder into a rigid solid. The preform is now heated until it is in the gel condition when it is placed in the mould cavity. The punch is lowered into the cavity, due allowance being made for the escape of the trapped air, and pressure exerted to form the moulding into its final shape. The mould is heated to prevent the solidification of the moulding before it has assumed this shape, but the temperature is below that of the melting point. This method of moulding has been used successfully for several years by Edison Swan Electric Co., Ltd., at their radio components factory. In Fig. 1 can be seen the making of the preform, Fig. 2 the heating ovens, and Fig. 3 the moulding press. The important factor in this method of moulding is the use of the exact quantity of powder in making the preform as no external flash can be

Fig. 1.—Filling the preform mould with p.t.f.e. moulding powder.

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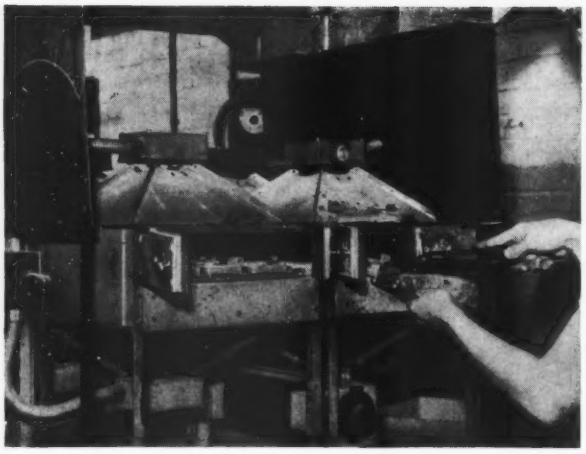


Fig. 2 (left). Heating the preforms prior to moulding.

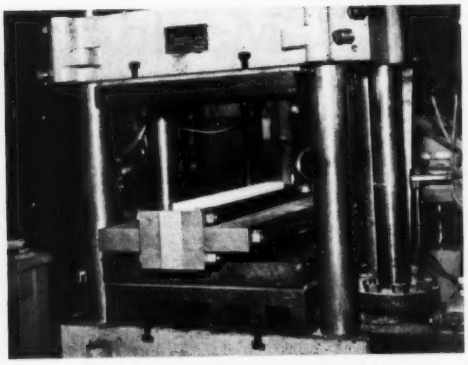


Fig. 4 (above). Preformed bar in mould.

formed on the moulding. There is also a change in volume of about 25% at the transition temperature which must be taken into account.

It is an interesting point to note that the shrinkage, after sintering, occurs in a plane at right angles to the direction in which the pressure was applied. This shrinkage may be 5-10%, depending on the shape of the moulding and the pressure applied to the preform.

Blocks and Bars

For the forming of blocks and bars a different technique has been evolved although the same basic principles are used. A preform is again made, the pressure this time being applied by a hydraulic press; great care has to be taken to ensure an even distribution of powder in the mould, or variations in density in the preform will cause distortion and weakness in the finished moulding. Fig. 4 shows a cold pressed bar before the heating process. The bar or sheet can now be dealt with in two ways, by free sintering or pressure sintering. In the former the bar is removed from the mould and placed in an air circulating oven as illustrated in Fig. 5. The temperature is then brought slowly to 360° C., and cooled, the whole process taking up to 18 hours or more to complete, depending on the thickness of material. Pressure sintering is more generally applied where thick sections (over 1 in.) are required. The preform and mould are heated in the oven to 360° C., for a definite time, again dependent on wall thickness, and on removal subjected to low pressures (less than 2,000 p.s.i.) while cooling.

Rod and Tubing

Rod and tubing can be made by a modification to the extrusion process or by the preform method. In the latter method the length of tube or rod is necessarily limited by the daylight of the press, although recent developments by Edison Swan Electric Co., Ltd., now enable rollers up to 5 ft. in length to be covered in one operation.

The extrusion process uses the extruder to force the powder into a steel tube which is heated for a pre-determined length to a temperature between 380° C., and 400° C. The expansion on heating causes a back pressure to build up equivalent to a preforming pressure, but as the tube passes to the cooler zone contraction occurs. Speeds of extrusion are only a few feet per hour and temperature and pressure are critical factors in the process.

It should be noted that where the temperature of p.t.f.e. has to be raised above approximately 200° C., a small quantity of toxic gas is given off and it is therefore necessary to provide exhaust ventilation for the sintering ovens and other apparatus.

Machining

The machining of p.t.f.e. has long been a faithful stand-by where difficult and complex shapes have to be produced in small quantities, and the excellent machining qualities are apparent in Fig. 7 where tape is being "peeled" from the solid rod on a lathe. Sharp tools will provide film from .003 in. thick within ± .0005 in. limits.

The remarkable non-adhesive properties of p.t.f.e. which have provided many sources of profitable application, have

Fig. 3 (left). The moulding press with the tool open, showing preforms in cavity before moulding.

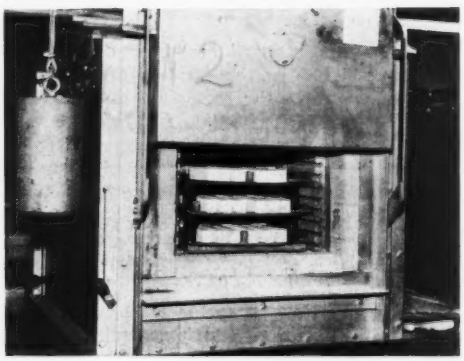


Fig. 5 (right). Sintering oven for rods, blocks, bars and tubing.

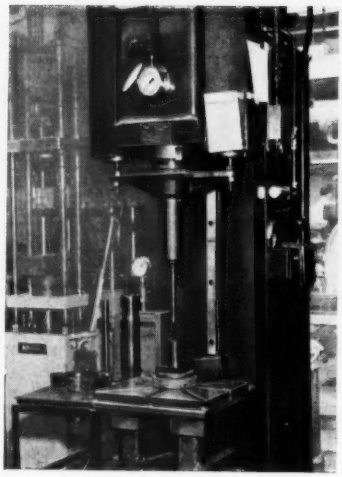


Fig. 6 (left)—Hi-Ton press used for the production of rods and tubes. On the bench at the left is a larger size mould and punch.

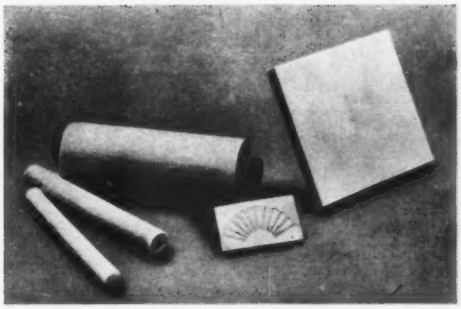


Fig. 8 (right)—Fabrications from p.t.f.e. including a bakery roll and a metallized p.t.f.e. circuit.

also provided a problem where bonding of p.t.f.e. is required. The welding techniques developed for polythene and p.v.c. are not really successful and efforts to find a bonding cement have as yet proved unavailing. Scarf jointing of p.t.f.e. sheets has proved most successful when a flux made from a fluorocarbon oil and a dispersion of finely divided p.t.f.e. has wetted the surface prior to the sintering of the join. Perfect contact between the strip heaters and join, and consequent uniform pressure and heat transfer, are essential.

A recent development by Edison Swan has relieved this problem considerably and now on the market is p.t.f.e. sheet with a metallic surface to which normal soldering techniques can be applied. This should open up a considerably wider field of application in the electronic and radio industries.

P.T.F.E. Dispersion

Aqueous dispersions of p.t.f.e. were first developed in 1946 and are now used in the electrical and engineering industries. The dispersions are applied using normal paint spraying equipment and after drying are sintered above the transition temperature. Colouring pigment can also be added so that a dispersion having the appearance, even when applied, of paint is produced. Stabilized dispersions can have concentrations of up to 70% solids. Using these dispersions, glass mat laminates, sprayed metal bearings for aircraft instruments, glass fibre p.t.f.e. string, non-stick moulds, and film have been prepared. The materials to which the dispersion is to be applied must be able to withstand temperatures above the 327° C., necessary for the sintering process.

Applications

Finally a few words on the applications to which p.t.f.e. has been advantageously put. In the electrical, electronic and radio industries, valve holders, insulating tapes, cable and wire covering, high frequency cable spacers, condensers and hermetic seals are a few of its known applications. The chemical industry has turned to p.t.f.e. as a substitute for platinum, and evaporating dishes, beakers, and other apparatus are now being made from it. Corrosion-resistant valves, gaskets, packings and seals are other applications and development is proceeding in its use as a tank lining material. The non-frictional qualities of p.t.f.e. have provided many engineering applications, and bearings, guides, valves and gaskets are being widely employed. Other uses include the covering of rollers on machinery which handles dough, size and other sticky materials. P.t.f.e. tape for electrode covering on heat sealing apparatus, impregnated metal bearings, and feed hopper linings are established applications covering a wide range of industries.

Other uses where the non-stick properties of p.t.f.e. have proved a great advantage are in the covering of sizing rollers in the textile industry, the covering of rollers in the paper and cardboard rolling mills, and the covering of glue rollers in plywood and veneer manufacturing plants.

From the foregoing notes a general idea of the properties, possibilities and methods of fabricating p.t.f.e. can be gleaned. Developments in its use are progressing but its high cost has precluded many everyday applications which it would benefit. It is, however, a material with an infinite variety of possibilities, as can be seen from its list of applications, and in these days when the call for new and improved materials is so great it cannot fail to provide an answer to some, at least, of the problems.

Footnote. Skis with the planing surface covered with p.t.f.e., have proved to be faster than any others due to the low friction resistance.

We are grateful to the I.C.I. Plastics Division, for making available the information on p.t.f.e., and to Edison Swan Electric Co., Ltd., whose knowledge of the techniques of fabricating and moulding this material gained from many years experience we have called on in the compilation of this article.

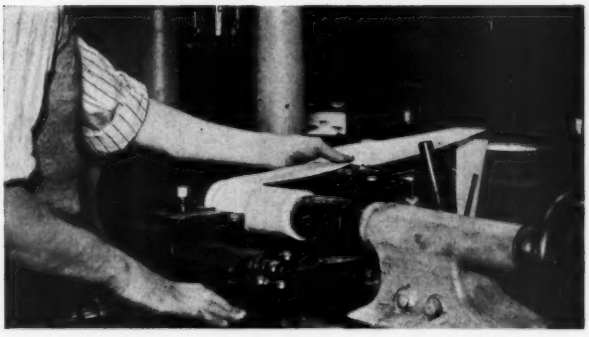


Fig. 7.—Manufacturing p.t.f.e. tape on an engineering lathe.

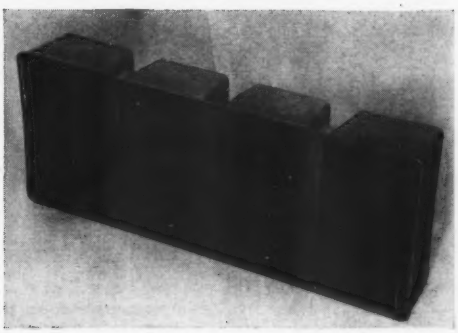
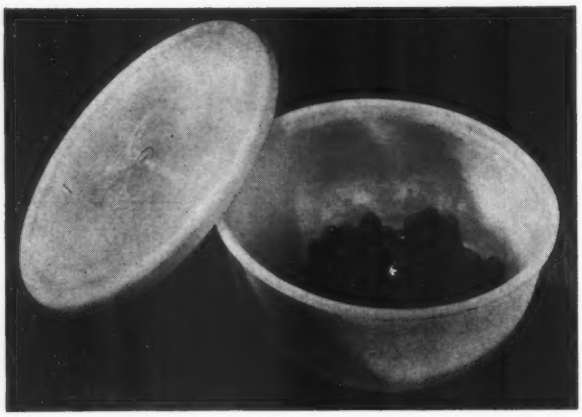


Fig. 9.—Baking tins sprayed with p.t.f.e. "paint" to prevent sticking.

New Productions



A new development in the household sphere is the introduction by Halex of a seven inch bowl with a tightly fitting lid, suitable for use in the larder or the refrigerator.

Polythene Bowl

Illustrated above is a seven inch polythene bowl, now available with a tightly fitting polythene lid, making it suitable as a container for the larder or refrigerator. The unit is available in ivory, green and red and is manufactured by the Halex Division of the British Xylonite Co., Ltd., Higham's Park, London, E.4.

New Productions From Paris

We were in Paris recently, in the spring, and two novel features at the Galeries Lafayette particularly caught our fancy. The first of these was a tortoise some three inches long, the integral parts of which were moulded in polystyrene. Having the realistic grey/green colour of the average tortoise, the head and tail were mounted cunningly on springs so that under the slightest vibration both moved slightly from side to side. One of the tortoises was caught by our cameraman whilst temporarily motionless and can be seen below.

Also very attractive were the p.v.c. table decorations, useful as glass mats, and stamped from sheet and embossed with a leaf pattern. These are decoratively coloured in attractive autumnal tints and as a set, form a very elegant table decoration. There is no reason why they should not be inexpensive to manufacture.

Motorcycle Sidecar

Plastic Motor Bodies, Ltd., of 69 Weston Street, Crystal Palace, London, S.E.19, have manufactured the motorcycle sidecar illustrated. The body has been fabricated from polyester/glass fibre reinforced materials, having been made integral with the chassis which is constructed of heavy 1½ in. gauge tubing mounted on an Armstrong telescopic suspension unit. The windscreen and rear window are of Perspex. Considerable strength has been gained with the aid of this method of construction, and it is interesting to note that the unit was conceived from the start as an all-plastic structure. It is intended that production versions should be self-coloured, to avoid spray-painting. Production will start as soon as the prototype has completed its 1,000-mile road test programme. So far 350 miles have revealed no major snags. It is interesting to note that the price of the complete sidecar is expected to be in the region of £120, relatively inexpensive for a model of this quality.

New sidecar which makes use of polyester/glass fibre material for the main structure, and Perspex for most of the glazing.

This tortoise bears a distinct resemblance to the real thing and makes use of the old toymakers trick of mounting the head and tail on fine springs. The slightest vibration causes both to move to and fro in a very realistic manner.

Inexpensive to make, and handsome to look at—autumn leaves in p.v.c. to decorate the dinner table.

Plastics NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes

PROCESSING MACHINERY.—Industrial Plastics, Ltd., Piccadilly House, 16-17 Jermyn Street, London, S.W.1, announce the completion of arrangements whereby they act as sole distributors of certain plastics processing machinery manufactures abroad. The companies which they will represent include Hartig Engine and Machine Co., Dr. Ing Fritz Sommer, Luigi Bandera, G.B.F., Milan, George Driver and Son, Coste and Chevaleyre, Condux-Werke, Ets. G. Decombe, Pourtier Pere et Fils.

NEW PLASTICS CARPET. — Vinyl material on a soft felt base makes a tough surface for a new floor covering called Marleytred. It is suitable for homes, offices or cars.

The designs, being embossed, are not only attractive in appearance, but provide a non-slip, hard-wearing surface, with the labour-saving qualities of modern plastics. The covering is waterproof, greaseproof and resistant to oil and domestic chemicals. Thick felt backing gives quiet tread and insulation against sound and draughts. There are 12 colours in a wide range of patterns, and rolls are supplied in 48-in. and 24-in. widths. Border Marleytred, for stairs and passages, is also available in rolls 22½-in. wide, and in the full colour range.

BRUSSELS INTERNATIONAL FAIR.—On the Board of Trade stand at this Fair there was a small display of well-designed products selected by the Council of Industrial Design. These products include a toy washing machine designed by F. Humphreys and produced by The Chad Valley Co., Ltd., a teddy bear designed by Sylvia Willgloss and made by Dean's Rag Book Co., Ltd., and a model plastic racing yacht made by International Model Aircraft, Ltd.

LONDON SITE FOR DESIGN CENTRE.—A permanent exhibition in London where well-designed products of British industry will be displayed is to have its address at 28 Haymarket, London, S.W.1. Arrangements have been made to open the centre as a permanent but changing exhibition early in 1956.

ACRYLIC MOULDING.—The plastics division of Imperial Chemical Industries, Ltd., have prepared an illustrated booklet on the properties, moulding techniques and types of Diakon moulding powder. It deals at length with the physical, electrical and chemical properties of Diakon, and also discusses injection and compression moulding.

PRODUCTION CONTROL LECTURE COURSES.—Following the successful conclusion of the first of a projected series of six weeks' full-time courses in the "Organization and Control of Production" it has been announced that future courses will begin in November and February each academic year. Further details can be obtained from Department of Industrial Administration, College of Technology, Suffolk Street, Birmingham, 1.

THE PRODUCTION EXHIBITION, 1956.—The second Production Exhibition and conference will be held in the Grand Hall, Olympia, London, from May 23 to 31, 1956.

S.P.E. CONFERENCE.—The 1956 annual conference of the Society of Plastics Engineers is to be held at the Hotel Statler, Cleveland, Ohio. The conference will start on Wednesday, January 18.

ANNUAL HOLIDAY.—British Insulated Callender's Cables, Ltd., announce that their works will be closed for the receipt of goods during the following periods:—

Prescot, Helsby, Melling and Hayton Quarry Works: Friday, July 22, to Saturday, August 6. Willenhall Foundry: Saturday, July 23 to Saturday, August 6. Erith Works: Saturday, July 16 to Monday, August 1. Anchor Works: Saturday, July 2 to Saturday, July 9, and Saturday, September 10, to Saturday, September 17. All dates are inclusive.

MR. J. M. TOWLER.—It is with regret that we record the death of Mr. J. M. Towler. His work was mainly concerned with the successful development of high-speed, high-pressure, heavy-duty hydraulic pumps for which Towler Bros. (Patents) are well known. Mr. J. M. Towler was joint managing director of this company.

THE AMERICAN LIBRARY.—A catalogue of recent additions to this valuable bibliographical service has been published recently. The library contains many American publications of both a technical and fictional character. Books can be borrowed free of charge. All inquiries should be addressed to The American Library, 41 Grosvenor Square, London, W.1.

BUILDING EXHIBITION.—The 26th Building Exhibition will be held at Olympia, London, from November 16 to November 30. Further details can be obtained from The Building Exhibition, 4 Vernon Place, London, W.C.1.

SILICONES.—A booklet issued by Midland Silicones, Ltd., 19 Upper Brook Street, London, W.1, describes a range of electrical insulating materials consisting of silicone resins and elastomers in various combinations with glass fibre, mica and asbestos.

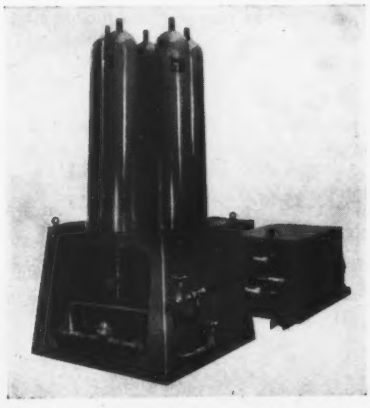
ENGINEERING, MARINE AND WELDING EXHIBITION AND FOUNDRY TRADES EXHIBITION is to be held at Olympia from September 1 to September 15. The preliminary list shows over 400 firms who will be exhibiting.

ORGANIC CHEMICALS.—A folder has been prepared by Albright and Wilson, Ltd., 49 Park Lane, London, W.1, giving the properties of some 14 organic chemicals and compounds. Included are data sheets for the Mellite resins based on the Shell Epikote resins. These resins are extensively used as stabilizers for vinyl resins.

EXHIBITION OF PRODUCTS FROM VINYL SHEETING.—An exhibition of the many everyday products which are made from vinyl sheeting was held in Manchester. During the show plastics rainwear, handbags, and shoes were modelled by professional mannequins. The organizers of the exhibition were Commercial Plastics, Ltd., who manufacture Fablon and Superlon vinyl sheeting.

BRITISH TRADE FAIR AT COPENHAGEN.—Monsanto Chemicals, Ltd., will be exhibiting at the British Trade Fair at Copenhagen. Included on their stand will be a section devoted to resins and plastics showing such products as phthalic anhydride, maleic anhydride and styrene monomer.

BRITISH STANDARD FOR THERMOPLASTIC FLOORING TILES.—The tiles specified are composed of a thoroughly blended composition of mineral asphalt, of thermoplastic resins, or of the solid or semi-solid products resulting from the distillation of oil or coal. Asbestos fibres and inert materials are used as fillers or pigments. Requirements for flexible or semi-flexible tiles made from vinyl chloride polymer and co-polymers or other polymeric compositions are not included. Copies of the standard, B.S. 2592, may be obtained from the British Standards Institution, 2 Park Street, London, W.1, price 2s. 6d.



The central hydraulic system shown by Finney Presses Ltd. at the B.I.F.

BRITISH XYLONITE CO., LTD., CHAIRMAN'S STATEMENT.—Mr. C. F. Merriam, in his statement at the Annual General Meeting held on May 31, reported a sales increase for the group of over 20%. The improvement was due to an excellent recovery by B.X. Plastics, Ltd., who increased sales by nearly 45%.

As was reported in the May issue of *Plastics*, a final dividend of 9% on the Ordinary Stock was declared.

MR. E. H. BEAUMONT, sales and technical manager of the Industrial Adhesive Division of Evode, Ltd., is this month leaving for a four weeks' tour of the U.S.A.

The purpose of his tour is to study the most recent developments in adhesives and their applications in American industry. He will also have important discussions with Evode's associates, Angier Products, Inc., of Boston, Massachusetts.

THERMO-PLASTICS, LTD.—The telephone number of Thermo-Plastics, Ltd., has now been changed to Dunstable 1444.

THE ELECTRICAL RESEARCH ASSOCIATION REPORT.—The annual report for 1954 gives details of the progress made in research work for the electrical industry. These include research into flameproof gear, insulated cables, arc-like discharges, dielectrics and other relevant problems, and provide an indication of the wide range of research covered by the Association. The address of the Association is Thorncroft Manor, Dorking Road, Leatherhead, Surrey.

BRITISH INSTRUMENT INDUSTRIES EXHIBITION.—The exhibition will be held at Earls Court from June 28 to July 9 during which time lectures and conferences will be held. The subjects include: Instrumentation as an Aid to Final Efficiency; Instruments in the Utilization of Steam; and Photocopying and Reproducing in Industry. Copies of the programme and admission tickets can be obtained from F. W. Bridges and Sons, Ltd., Grand Buildings, Trafalgar Square, London, W.C.2.

Griffin and George, Ltd., will be showing laboratory apparatus and furniture and scientific instruments covering a wide range of applications. Process and cyclic timers, liquid level control equipment and photoelectric amplifiers will be shown by Elcontrol, Ltd. Exhibits ranging from the simplest of process control instruments to the latest type of electronic digital computor will indicate the variety of instrumentation undertaken by Elliot Bros. (London), Ltd. Mervyn Instruments will be exhibiting an infra-red spectrometer for use in liquid and gas analysis. And Electro Methods, Ltd., will have a range of time delay switches, thermostats and thermometers on their stand.

MR. R. FORSYTH CAMERON.—It is with regret that we have to report the sudden death of Mr. R. F. Cameron, managing director of Storey Brothers and Co., Ltd.

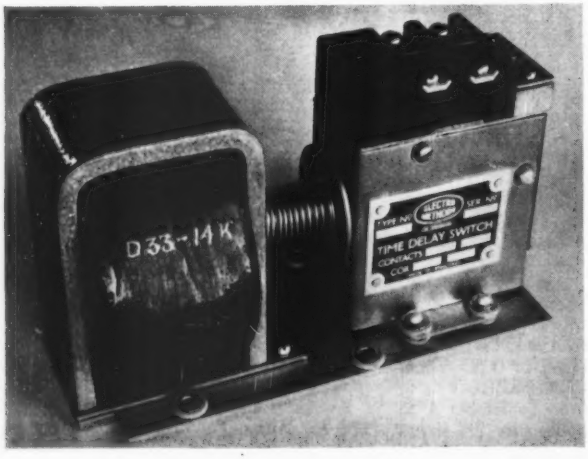
WORK STUDY.—A summary of the eight papers read at the B.P.C. work study conference held at Earls Court last March has been published by the British Productivity Council. These deal with the application of work study in various industries and the methods adopted to overcome technical difficulties. Copies of this summary can be obtained from the British Productivity Council, 21 Tothill Street, London, S.W.1, price 9d.

COURSE IN PLANT ENGINEERING.—Hatfield Technical College is to institute a course in plant engineering. Students will be accepted after gaining a National Certificate in mechanical or electrical engineering and the course will commence in September on two evenings per week and/or one full day per week. Further information can be obtained from the Head of the Works and Production Engineering Department, Hatfield Technical College.

THIRD BAEKELAND MEMORIAL LECTURE.—"Leo Hendrik Baekeland and Photographic Printing Papers" was the title of the third of the Baekeland Memorial Lectures given under the auspices of the Society of Chemical Industry at the Royal Institution, 21 Albemarle Street, London, S.W.1. The speaker was Mr. C. E. Kenneth Mees, vice-president, and director in charge of research, Eastman-Kodak Co., and a director of Kodak, Ltd.

CHANGE OF ADDRESS.—The Zinc Development Association and its affiliates, the Hot Dip Galvanizers, the Zinc Alloy Die Casters and the Zinc Pigment Development Associations have moved their offices from Oxford. The new address is 34 Berkeley Square, London, W.1, telephone number, Grosvenor 6636.

TELEGRAPH CONSTRUCTION AND MAINTENANCE COMPANY REPORT.—A dividend of 3¼% less tax on Ordinary shares and a cash bonus of 1% less income tax was recommended by the directors. Mr. J. N. Dean, the chairman, speaking of the plastics division, said that the production of polythene powder would soon be increased substantially, and he hoped soon to have some very good news from this division.



Time delay switch manufactured by Electro Methods, Ltd., Caxton Way, Stevenage, Herts.

POLYTHENE BY THE LOW-PRESSURE PROCESS.—Phillips Chemical Company have started to construct a plant at Pasadena, Texas, for the production of polythene by their low-pressure catalytic process. Properties claimed for the new material are: better resistance to chemical attack, non-brittle characteristics at low temperatures (−175° F.) and no deformation at temperatures up to 250° F.

REORGANIZATION OF BRITISH OXYGEN CO., LTD.—In order to leave the parent company free to concentrate attention on the promotion of development and the general guidance of the activities of all operating units at home and overseas, British Oxygen Co., Ltd., are to complete the segregation of home operational activity under appropriate subsidiary companies. The units affected will be the industrial, medical, and electrical welding units. A new subsidiary British Oxygen Chemicals is to be formed.

Mr. T. E. Potts and Mr. J. Strong have been appointed directors of the parent company.

VINYL COATED PAPER AND CLOTHS.—Vinatex, Ltd., have made an arrangement with Daniel Buchanan and Sons, of Prestonpans, Nr. Edinburgh, for the transfer of their p.v.c. coating department to Prestonpans. The complete range of Vinatex p.v.c. coated materials will be manufactured and sold in future by Daniel Buchanan and Sons and there will be close technical co-operation between the two companies.

B.T.H. DISTRICT OFFICE CHANGES.—Mr. H. G. Harlow has moved from Leeds to take over the managership of the Newcastle office. Mr. W. J. Wilson has been appointed manager of the Leeds office.

INDUSTRIAL SAFETY.—A conference was held at Scarborough last month under the auspices of the Royal Society for the Prevention of Accidents. This annual exhibition and conference discusses problems and methods connected with the prevention of accidents on industrial premises.

INTERNATIONAL PRINTING EXHIBITION.—The latest developments in the manufacture of stereos and matrices in plastics and rubber will be on show on the stand of Plastotype, Ltd., 56 Stamford Street, London, S.E.1. The exhibition is being held at Olympia, London, in July.

"TO SHAPE TOMORROW."—Bakelite, Ltd., have sponsored a new film in which they show the development, production and uses of four of their products. The products are: shell-moulding resins, Vybak vinyl resins, compounds and sheets, polyester resins and Warerite decorative laminates. The film is available in 16 mm. and 35 mm. Eastman colour prints and the running time is 27 minutes. Applications for the loan of prints should be made to Bakelite, Ltd. (Publicity Dept.), 12-18 Grosvenor Gardens, London, S.W.1.

HARDENERS.—Of interest to users of urea-formaldehyde adhesives is the latest technical bulletin No. 147 issued by Aero Research, Ltd., Duxford, Cambridge. Details on the composition, function and mode of operation of hardeners are given together with a table of pot life and setting times.

PRESENTATION OF COLLEGE ASSOCIATESHIPS.—At a ceremony held at the Town Hall, Birmingham, Diplomas of Associateship were presented to successful students of the City of Birmingham College of Technology. The principal, Mr. J. Wilson, in his statement mentioned the necessity of close co-operation with industry in planning future courses and new departments, and warned of the dangers of specialization by well-qualified people in a comparatively narrow field of application of technological knowledge.

MR. H. A. COLLINSON has been appointed chairman of the main technical committee of the British Plastics Federation.

VARIABLE GEAR FOR EXTRUDERS.—The Beier gear, now being manufactured under licence by Armstrong Whitworth, Ltd., is being fitted to a Projectile and Engineering Co., Ltd., extrusion machine.

THE SHAPE OF THINGS TO COME.—An American report says that following a television showing of raincoats made from Vinyl sheet the T.V. station switchboard and the store were swamped with calls.

THE PLASTICS INSTITUTE CHANGE OF ADDRESS.—On June 22, the Plastics Institute will move from the Adelphi to the ground floor of No. 6 Mandeville Place, London, W.1.

COMPANY DIVIDEND.—The directors of O. and M. Kleemann, Ltd., have declared an interim dividend on the £208,531 Ordinary stock of 12½% actual (against 25% on £102,028) less income tax for the year ending August 31, 1955, and in addition a bonus of 5% actual less income tax to mark the golden jubilee of the founding of the business in March, 1905. Also a Dividend on the £157,344 Preference Stock of 2¾% actual, less income tax, for the half-year ending June 30, 1955.

DIRECT DELIVERY SERVICE TO NORTHERN IRELAND.—Direct delivery from London and the North to Northern Ireland by pantechnicon has been instituted by three companies, Evan Cook's Depositories, Ltd., Queen's Road, Peckham, London, S.E.15; James Brown and Son (Belfast), Ltd., 300 Newtownards Road, Belfast, and John Mason (Wavertree), Ltd., 127 High Street, Liverpool 12. The new service will avoid trans-shipment of goods and consequent risk of breakage.

BAKELITE, LTD., REPORT.—The annual general meeting of the company will be held on June 9 at Grosvenor House, Park Lane, London. The report of the directors shows a profit before taxation of £648,829 compared with £332,367 in 1953. Recommended final dividend is 11% less tax. Enclosed with the report is a booklet illustrating the use of plastics in industry.

ITALIAN INDUSTRIAL DESIGN.—An exhibition of Italian industrial design is to be held at the Italian Institute, 39 Belgrave Square, London, S.W.1, from June 30 to July 30.

MR. A. M. WORSWICK, formerly chief designer, press division, Foster Yates and Thom, Ltd., has been appointed chief engineer of Towler Brothers (Patents), Ltd., Rodley, nr. Leeds.

HOLIDAYS.—Howards of Ilford will be closed from July 18 to August 1 inclusive.

DR. W. BLAKEY has been appointed a director of British Industrial Plastics, Ltd.

"MAKING A MOVE," is the title of a booklet issued by the London County Council giving details of industrial facilities in towns which are proposed for expansion programmes. Inquiries regarding planning problems should be addressed to The Architect to the Council, London County Council, County Hall, London, S.E.1, and inquiries in respect of industrial sites and buildings should be sent to The Valuer to the Council at the same address.

CATALIN, LTD.—The directors announce that the group net profit for 1954 was £12,359 after taxation. A dividend of 5% less tax has been recommended.

INCORPORATED PLANT ENGINEERS' ANNUAL CONFERENCE.—At the annual conference, held at St. Annes, various papers were read on different aspects of the work and future of the plant engineers' position. Among subjects discussed were the use of new materials, including both thermoplastic and thermosetting plastics materials.

BRITISH CHEMICAL PLANT MANUFACTURERS' ASSOCIATION.—At the annual general meeting of this association Mr. W. J. Horton was re-elected chairman, and Mr. H. W. Fender, Mr. I. M. O. Hutchison and Mr. R. W. Rutherford elected vice-chairmen.

CHAIRMAN OF INSTITUTE OF PACKAGING.—Mr. Harry Jefford, vice-chairman elect, has been elected chairman of the Institute of Packaging. Mr. A. Fraser Much, vice-chairman, was not able to accept the chairmanship on account of his new appointment with I.C.I.

INDUSTRIAL ART BURSARIES.—Travelling bursaries of about £150 are being offered to industrial designers and students by the Royal Society of Arts. The competition, which will follow the same lines as previous years, will include designs in or for acrylic, p.v.c. and laminate sheeting. The closing date for entries is October 10. Details of conditions can be obtained from the Secretary, Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2.

BRITISH STANDARD FOR PARKING LIGHTS.—A standard has been prepared to cover the manufacture and design of single parking lights. The basis of the new standard, B.S. 2605 : 1955, is a series of tests including exact measurement of colour and intensity of light emitted, vibration tests, moisture-penetration test, and tests for the resistance to petrol and corrosion.

POLYSTYRENE DISPERSIONS.—A booklet issued by Monsanto Chemicals, Ltd., gives details of plasticized and unplasticized polystyrene dispersion for use in the coating and laminate industry. The dispersions have from 40% to 50% solid content. Copies of the booklet can be obtained from Monsanto Chemicals, Ltd., Victoria Station House, London, S.W.1.

CHANGE OF ADDRESS.—Stone and Simmons have changed their address to 225-226 Blackfriars Road, London, S.E.1. The telephone number is Waterloo 4697.

BUTYL CARBITOL AND GLYCOLS.—A technical bulletin, F-8636, giving facts and figures for Butyl Carbitol (Diethylene Glycol Monobutyl Ether) has been issued by Carbide and Carbon Chemicals Co., 30 East 42nd Street, New York 17.

Also issued by the same company is a 60-page book describing Glycols.

CELLULOSE FILM.—A 70-page booklet published for British Cellophane, Ltd., 12-13 Conduit Street, London, W.1, has been designed to answer some of the questions asked about Cellophane. Chapters are devoted to wrapping machinery, uses, properties and manufacturing methods for cellulose films.

VISIT TO G.E.C. RESEARCH LABORATORIES.—A committee composed of members of both Houses of Parliament and representatives of scientific institutions made a 2½-hour tour of the G.E.C. research laboratories at Wembley.

SILICONES FOR INDUSTRY is the title of an exhibition to be held from June 13 to June 18 at the Midland Hotel, Manchester. The exhibition has been organized by Midland Silicones, Ltd., and shows the history, production and applications of silicones. Invitations can be obtained from Midland Silicones, Ltd., 19 Upper Brook Street, London, W.1.

ELECTRO-ACOUSTICS.—Telling the story of Cosmocord, Ltd., is an illustrated booklet depicting the many different processes which go into the manufacture of gramophone pick-ups, microphones and other electro-acoustic equipment.

NEW TELCON FACTORY IN SOUTH AFRICA.—Telegraph Construction and Maintenance Co., Ltd., have opened a new factory at Wadeville Germiston, Transvaal. Initial production will be of thermoplastic insulated cable. The sales organization at Wadeville will also handle the plastics products made by Telcon.

AMERICAN LABEL AWARD.—The Society of Plastics Industry award for the most informative label identifying a consumer product made of plastics was presented to American Cyanamid Company for the Melmac dinnerware tie tag. Presentation was made by SPI President, John O'Connell, at the annual meeting of the Society on board the "Queen of Bermuda."

The first SPI contest to be judged solely on the merits of an informative label was part of the Society's public relations programme to better consumer understanding of plastics materials.

UNPUBLISHED REPORTS. — Report PB108320 deals with a method of weather-proofing standard metal spectacle frames by coating with a plexiglass-chloroform solution. IR11260 gives a detailed description of the making of spectacle frames and the finishing and colouring of celluloid frames.

Studies in the changes of polythene due to pile irradiation at 80°C. in density, percentage of crystallinity and Young's Modulus are given in report AERE M/R1401. Also the degradation of cellulose by ionising radiation and some of the results obtained are contained in AERE M/R1342.

Copies can be obtained from Department of Scientific and Industrial Research, Cunard Building, 15 Regent Street, London, S.W.1.

TALKING SHOP . . .

Lay-flat Tubing. B.X. Plastics, Ltd., report that they are now offering experimental quantities of three types of Velbex p.v.c. lay-flat tubing for packaging and other purposes. The equipment currently available permits the company to offer the lay-flat in widths of 2 to 5 in., in ½ in. increments and, with a wall thickness of 2 to 5 mil., in ½ mil. increments.

It has not yet been possible to obtain a matt surface to the inside of the tube with the result that a normal soft mix tends to block. The lay-flat is therefore manufactured in harder grades than in the normal sheet formulations and fillers may be added. The three formulations now available are: Type A, a translucent lay-flat recommended for food packaging; Type B, a clear transparent lay-flat recommended where good transparency and outstanding oil and grease resistance are required; and Type C, opaque or translucent as may be required, suitable for less critical packaging purposes. This lay-flat is claimed to be stronger and to have higher resistance to grease and oil than has polythene, although not so high as Type B. All three grades are remarkably tough and tear-resisting, having a breaking stress of between 2,500 and 3,500 lb. per sq. in. The company has not yet made any detailed studies of water vapour transmission but this is expected to be the same as normal p.v.c. sheet which is a little more permeable than polythene, but much less so than cellulose acetate or nylon.

A technical service bulletin, No. 22, is available on this interesting new development from B.X. Plastics, Ltd., Chingford, London, E.4.

* * *

Extrusion Plant for Malaya. Early in May, Mr. Norman Mason, the extruder manufacturer of Luton, saw off £5,000 of extrusion plant on the first stage of its journey to Malaya. The plant incorporates three machines capable of extruding tubes from ½ in. to 4 in. diameter, and is to be used for the manufacture of polythene tubes for irrigation work.

* * *

Mould Release Agents. Scott Bader and Co., Ltd., have just issued technical leaflet No. 98 which deals with release agents, particularly useful in the production of glass fibre reinforced laminates and mouldings. Five main types are offered for sale, the first in the form of a quick-drying cellulose acetate solution of special value when used on wooden tools or plaster or other porous surfaces. This release agent contains a red dye which helps the operator to detect any area of the mould which has not been coated.

Crystic release agent No. 2 is in the form of quick-drying polyvinyl alcohol solution, used to greatest success on moulds made of metal or laminate. It is frequently employed as a secondary expendable film on a mould surface which has already been treated with Carnauba wax.

Dribrite E.80 is a special wax emulsion and can be used on any type of mould surface.

Copies of this technical bulletin can be obtained from the company at 109 Kingsway, London, W.C.2, and will be very useful to anybody who is concerned with release agents and reinforced plastics.

* * *

B.I.F. Under New Management. The British Industries Fair in May was the first to be held as a private venture and I was very interested to know whether or not the change of management had affected in any way either the nature of the Fair or the response to the Fair by British industry and by overseas buyers. I am happy to report that the *status quo* appears to have been preserved; although in the plastics industry we have our own exhibition every two years, the British Industries Fair contains, none the less, a very representative cross-section of progress in plastics and this is true of all industries represented, whether or not they hold specialized exhibitions of their own.

This year's B.I.F., reported elsewhere in this issue, contained many interesting developments involving the use of plastics and demonstrated especially the very strong hold polythene has gained in the household sphere.

A number of well-known companies was exhibiting at Castle Bromwich, including British Celanese, Ltd., Imperial Chemical Industries, Ltd., Bakelite, Ltd., and Halex.

* * *

Mr. H. A. Collinson has been appointed chairman of the Main Technical Committee of the British Plastics Federation. Mr. Collinson, who is a Fellow of the Royal Institute of Chemistry and an Associate of the Plastics Institute, is the technical director of Leicester, Lovell and Co., Ltd.

* * *

Know Your Competitors. For some time the *Financial Times* has been running a series under the above title, its issue for May 11 contained No. 14. This article, written by the Bonn correspondent of the paper, discussed German chemicals, and, as might be expected, contained considerable information on the polythene developments currently taking place in Germany.

The article is written around Herr W. A. Menne, chairman of the German Association of Chemical Industries. One of the remarks quoted in the *Financial Times* is, "The future lies in plastics made from oil."

Herr Menne is also on the board of Farbwerke Hoechst, one of the concerns which has taken up the Ziegler process. As noted in last month's "Talking Shop," three factories are under construction to manufacture polythene with the new type of catalyst working at normal pressures, and it is expected that production of polythene in Germany will reach 60,000 to 70,000 tons within the next two years. The Shell Company is reported to have joined forces with the Badische Analin organization to construct a plant near Bonn with a capacity of 12,000 tons a year. It is not clear, however, whether this latter plant will operate the Ziegler process or will work with high pressures. Whatever the result, there is certain to be severe competition in Germany amongst the large chemical manufacturers producing polythene.

* * *

P.V.C. Belting for the Mines. According to the *Financial Times* for May 12, the National Coal Board has awarded a contract of over £4 million to Rubber Improvement, Ltd., for the supply of ¼ million feet of fire-resistant p.v.c. conveyor belting in the mines every quarter until July, 1956.

* * *

S.P.E. Journal. This month, we resume, after a long break, the publication of reprints from the Journal of the Society of Plastics Engineers Inc., of America. This month's article, taken from the April issue of the S.P.E. Journal, was prepared in the laboratories of E. I. Du Pont de Nemours, Inc., of Wilmington, Delaware, and discusses the sliding friction of p.t.f.e. It coincides with the visit of one of the editorial staff of *Plastics* to the Bristol works of the Edison Swan Co., who have for some time been engaged in very interesting work with p.t.f.e., recorded in this issue under the heading, "Moulding and Fabricating with P.T.F.E."

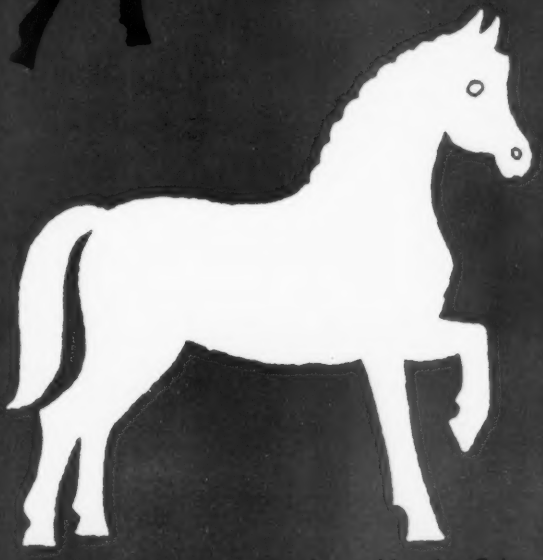
Although still an expensive material, judged by any standards, the many unique properties inherent in p.t.f.e. offer fascinating fields for experimentation. Only a few days ago we were discussing with a member of the British Olympic Bob-sleigh Team the possibility of coating bob-sleigh runners with p.t.f.e., as a means of increasing speed. It may well be that our next Olympic Gold Medal will be a partial result of the use of p.t.f.e. in this way. Wherever friction is a problem, the use of p.t.f.e. warrants close investigation. And on a lighter note, a frying pan made of this remarkable material will cook eggs without fat.

* * *

Rubber Improvement Essay Competition. Rubber Improvement, Ltd., of Wellingborough, in conjunction with the Iron and Coal Trades Review have recently run an Essay Competition throughout the mining industry on the subject of "Present and Future Development of Plastics in the Mining Industry." The competition, first prize for which was £70, attracted many hundreds of entries from collieries throughout the whole of the country. The judging was done by Mr. John Lewis, chairman and director of development of Rubber Improvement, Ltd., Mr. W. J. Reynolds, director of Rubber Improvement, Ltd., Mr. F. H. Harley, Editor of the Iron and Coal Trades Review, and Mr. E. L. Chiverton, president of the National Association of Colliery Managers.

PLASTIKON.

a horse



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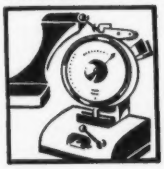
MATERIALS and TESTING



New winding device for extruded plastics monofilaments. — A. Schmitt discusses the problem of winding an elastic thread of various thicknesses with considerable differences in effective spool diameters using a minimum pull. Individual drive of each spool by an Alquist motor with such characteristic that the arbitrary pull (between 5 and 150 g) remains constant for the various speeds.
(*Kunststoffe*, 1955/March/104.)

Heating cylinders for injection moulding machines.—H. Gastrow discusses the requirements for efficient heating and describes several methods to increase the efficiency of the heating chamber without damage to the compound. Three types of chambers are described: a long cylindrical chamber; a conical chamber and a chamber widening conically combined with mixing compartments; the latter design is described in detail.
(*Kunststoffe*, 1955/March/122.)

American reinforced plastics industry.—A survey of activities and future trends was given at the 10th Annual Conference of the reinforced plastics division of the Society of Plastics Industry.
(*Autom. Industries*, 1955/March 15/234.)

Miner's lamp of polyamide.—The heavy cast-iron battery housing is now replaced by an injection moulded white housing which is fixed to the miner's belt; the lamp, also of polyamide, is fixed to the helmet. The new housing has only 1/3 of the weight of the former design. Rigid fracture tests were carried out before acceptance.
(*Kunststoffe*, 1955/March/124.)

Single screw extruders.—W. Meskat discusses the theory of the flow of Newtonian liquids through screw extruders as advanced in French and American investigations and will then deal in a second part with Non-Newtonian liquids, ultimately discussing experimental results.
(*Kunststoffe*, 1955/March/87)

Extrusion developments.—H. Reifenhauser discusses the latest deveolpments in this important field, such as production of tubes and that of foils by blowing and spreading of tubularly produced foils.
(*Kunststoffe*, 1955/March/93.)

Impact thermosetting plastics.—According to P. E. Fina moulded impact plastics should be considered for parts (a) which have to compete in toughness with durable woods and metals, (b) which must be corrosion resistant and require extra strength, (c) which would require excessive, costly finishing operations in other materials, (d) which need strength and excellent electrical and heat-resisting properties.
(*Machine Design*, 1955/March/208.)

The place of the polyacrylates.—C. T. Kautter compares polyacrylates and methacrylates with other hard thermoplastics of similar processing characteristics. He deals with chemical resistivity, mechanical and thermal properties and describes applications and manufacturing methods.
(*Kunststoffe*, 1955/April/137.)

Resinification of phenol alcohol.—According to J. Reese primary reaction products of alkaline or acid phenol-formaldehyde condensations can be simply separated and identified by a two-dimensional paper chromatographic technique, applicable only to materials with up to three phenol residues per molecule.
(*Kunststoffe*, 1955/April/150.)

Plastics coatings.—V. Vinson gives a survey of the methods of applying p.v.c. and polythene coatings to metal parts, which have created a new branch of finishing operations.
(*Electroplating*, 1955/April/141.)

A metal-containing resin can be shaped by usual methods into complex parts to make jigs and fixtures, washers and models. One of these epoxy-base resins contains aluminium, others copper, iron, stainless steel or even quartz.
(*Machinery* (N.Y.), 1955/April/184.)

A vinyl-metal laminate is said to combine corrosion resistance of vinyl plastics with the formability of metal. Material can be deep drawn, sheared, crimped, back embossed without damage to the coating or bond.
(*Machinery* (N.Y.), 1955/April/184.)

Glass-plastics laminate.—A high strength, uniform quality glass-plastics laminate sheeting is mouldable by ordinary methods for making structural members. The material consists of one or more uncured mouldable sheets of plastics reinforced with linearly aligned, continuous glass filaments. Three sheets may be laminated together at 120-deg. angles, to give equal strength in all directions in the laminating plane.
(*Machinery* (N.Y.), 1955/April/186.)

INDUSTRIAL APPLICATIONS

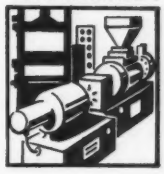
Miniature apparatus in plastics.—In electronic equipment small parts are generally mounted on insulating cards with their wire wrapped around soldering lugs or terminals. The cards must first be punched from insulating material, the terminals clamped or riveted on, subsequently the parts are mounted by hand. In the new Minaplas assemblies most of the hand operations are eliminated by mounting small parts on plastics rails, the pigtails serving both for mounting and connecting.
(*Bell Laboratories Record*, 1955/March/81.)

Roof-covering with plastics.—Re-roofing of flat roofs with inorganic fabric woven roofing made entirely of glass fibres is recommended. One ply application of material should provide water-tight protection for at least 10 years without re-coating.
(*Power*, 1955/Jan./140. *McGraw Hill Digest*, 1955/March/19.)

Plastics in cables.—The American Signal Corps held a Wire and Cable Symposium, December 7-9, 1954, at which 24 papers were presented, amongst them one on "Butyl Insulation," by W. C. Smith, "The ageing of polythylene compositions," by N. D. MacLeod, "An evolution of vinyl hook-up wires," by A. H. Lybeck and S. J. Trykowsky; "The effects of conductor temperature on the quality of extruded vinyl wire insulation," by E. E. Griesser and M. M. Suba; "A resin sealed approach to communications splicing," by E. W. Bollmeyer.
(*Wire and Wire Products*, 1955/March/320.)

Sealing rings for shafts.—O. Sell surveys the different types of plastics sealing rings suggested, and discusses their limits of application usually given by the properties of the applied sealing materials.
(*VDI-Zeits*, 1955/March/226.)

PROCESSES : MACHINERY



Paris Plastics Exhibition.—A short report is given of the exhibition which took place from December 3-12, 1954. Plastics products, equipment and machinery were shown, and a conference at which four international authorities discussed present problems was held.
(*Kunststoffe*, 1955/April/150.)

Design of injection moulds.—H. Gastrow describes a number of interesting tools for components with recesses and undercuts. The problem is usually solved by tools with ancillary slides.
(*Kunststoffe*, 1955/April/165.)

MISCELLANEOUS USES

Perforated plastics in copy camera.—Bonding a sheet of perforated Bakelite to a labyrinth-faced casting has reduced the costs of a vacuum film holder to 1/6 of the costs of the previous design.
(*Design News*, 1955/March 15/20.)

Plastics putty.—A viscous metal-filled plastic "Plastik-tul" can be moulded like putty to conform to almost any model or pattern and then hardened to produce precision replica of the original.
(*Design News*, 1955/March 15/88.)

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LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Tools for Vacuum Forming

SIR,—The article entitled "The Future of Vacuum Forming" in the May issue of *Plastics* refers to the use of wood and light alloys as the basic toolmaking materials, with plaster of Paris lacking the necessary strength.

Phenolic casting resins have proved excellent for making vacuum tools and both hot and cold set varieties are available. Such resins have adequate strength (as indeed is shown in the table on page 157 of the same issue), a smooth surface and do not shrink. Moreover, even for those who prefer to use plaster of Paris for prototype work the strength of such material can be greatly increased by incorporating a suitable U/F resin syrup.

Casting resins for forming tools are particularly useful for advertising signs, toys, plaques, etc., where the area is comparatively large, the edges are not acute and extremely close tolerances are not required.

We manufacture a wide range of casting resins under the name Cataform and of plaster reinforcing resins under the name of Catalure.

CATALIN INDUSTRIAL RESINS, LTD.
Waltham Abbey,
Essex.

Cellular Polythene

SIR,—We have noticed that a number of cable manufacturers are using polythene in cellular form for insulation purposes.

As we are looking for a material of this nature in sheet form, could you please tell us whether cellular polythene is available in this country, and if so, who are the manufacturers?

THE ANTICOUSTIC CO.
204 High Street,
Guildford, Surrey.

Plastic-coated Wire

SIR,—We are hoping you can assist us in the following small problem. We use a rubber-coated wire in connection with our flash guns, and we think our article would have a better appearance if we were to use a plastic-coated wire such as is used with electric razors.

If you can indicate to us the names of one or two manufacturers of this wire, we shall be deeply obliged to you.

CORONET, LTD.
308 Summer Lane,
Birmingham, 19.

Knitting Wool Holders

SIR,—We have an inquiry from Danziger Brothers, of Johannesburg, for flexible or pliable plastic wool holders; these are for holding balls of knitting wool and are made of soft plastics material. We would appreciate any information you can give us regarding possible sources of supply of this particular article.

GOODE, DURRANT AND MURRAY, LTD.
197 Great Portland Street,
London, W.1.

Trade Name Inquiry

SIR,—We are anxious to get in touch with a firm using the trade mark "Hengor". We would be extremely grateful if you could forward to us the address of this firm.

TURNERS (NEWCASTLE UPON TYNE), LTD.
Camera House,
Pink Lane,
Newcastle upon Tyne, 1.

Window Display Units

SIR,—As subscribers to your journal we are wondering whether you could let us have details of manufacturing processes employed for the manufacture of seamless clear or pink stocking legs used for window display purposes made from plastics.

We are thinking of casting into a mould, but if there are other more modern processes we would be pleased to hear from you.

ELRI COMPANY.
Corner of Stark Road and 5th Avenue,
Elsies River, Cape Province.

[EDITOR'S NOTE: The normal method of manufacturing display legs for stockings is by the blowing, often with steam, of extruded acetate. One of the raw-material manufacturers, British Celanese, Ltd., have had great experience in working in collaboration with companies fabricating in this field and detailed information can be obtained from the company's London Office, Celanese House, Hanover Square, London, W.1.]

Biological Teaching Models

SIR,—For some years past I have been running a small business as a designer of biological and anatomical teaching models which have been cast for me from my own master models by a London firm specializing in plaster of Paris casts. Such casts are, of course, extremely faithful reproductions but are very greatly handicapped by the brittleness of the material, in the case of the small parts and excessive weight in the case of larger ones. For some time now my selling agents have asked me to substitute for plaster some form of plastic material which, while retaining the advantages of plaster as regards detailed reproduction, will at the same time possess such properties as toughness and less weight than the old medium.

I should be very grateful if you are able to give me any advice on these matters and/or put me in touch with some firm which would be willing and able either (a) to cast these models in some tough material such as that indicated early in the letter or (b) to undertake the impregnation and curing of batches of plaster casts from time to time.

W. J. BATT.
224 Broadway,
Yaxley,
Nr. Peterborough.

"Plastics in the Service of Man"

SIR,—I have seen in the December, 1954, issue of *Plastics* several articles of interest, and I would like to know the manufacturers of moulds from which they were made.

The articles are as follows: Polystyrene novelty toy by Injection Moulders, Ltd.; doll of the Rosebud series by Nene Plastics, Ltd.; Shirley walking doll by D. G. Todd and Co., Ltd.; a toy bear by Nene Plastics, Ltd.; model train set by Rovex Scale Models, Ltd.; "Pedigree" doll by International Model Aircraft, Ltd. Could you put me in contact with the manufacturers of the moulds for these items?

F. FELBAN.
Malinovski fasor 25,
Budapest 11, Hungary.

Protection of "Idlers"

SIR,—One of our oversea associates is anxious to obtain supplies of material which would serve to protect idlers on a pulley system, and it is thought that the material suitable for this purpose would be some form of plastic. There is a considerable demand for these idlers and it is thought that, if something suitable was made available in the particular areas we have in mind, considerable business could result.

The idlers in question range from 6 in. to 8 in. in diameter and 8 in. to 12 in. in length. They should be tough, durable and inexpensive and in one circular piece. Rubber has been found to be unsuitable as the belts are made of that material and the constant wear is too great.

We would be most grateful if you could put us in touch with a few manufacturers who may be interested in quoting us for such idlers.

NATHAN AND ALLEN, LTD.
131 Victoria Street,
London, S.W.1.

The Sliding Friction of Teflon

By J. B. THOMPSON, G. C. TURREL and B. W. SANDT

We are very pleased to publish the following article, which first appeared in the April, 1955, issue of the Journal of the Society of Plastics Engineers of America. The information was compiled at the Wilmington, Delaware, laboratories of E. I. du Pont de Nemours and Co. Inc.

COEFFICIENTS of sliding friction of filled and unfilled Teflon have been measured at temperatures from 25 to 300°C. in an apparatus designed to distribute the normal force evenly over the test sample. The values found for the coefficient of friction were lower than values previously reported[2, 3]. This may be due to the surface finish of the metal slider or to the fact that our apparatus measures values of the coefficient of friction which represents the limit of Shooter's relation: coefficient of friction=shear strength/yield pressure.

It has been known for some time that Teflon tetrafluoroethylene resin has unusually good anti-frictional properties. Values near 0.04 have been reported for the dynamic coefficient of friction of polytetrafluoroethylene[2, 3] sliding on steel or on itself. Shooter found the coefficient of friction to be independent of temperature up to 200° C. He also found, as we did, that the coefficient of friction varies with the normal force, being higher at low normal forces. Our measurements extend the temperature to 300° C. and the normal forces to 4,000 lb. The design of our apparatus permits a better measure of normal force than does Shooter's[2] or Bowers', et al.,[3] as discussed below.

Because of current interest in compositions of Teflon and inert fillers, the coefficient of friction of several such mixtures has been measured.

Apparatus: Operation and Theory

The coefficient of friction data were obtained with the apparatus shown in Fig. 1. The polymer samples were placed in the circular groove in the aluminium block A. The steel B in contact with the sample C was "Elastuff" A-2. For most of the measurements the steel was polished on a metallographic polishing wheel to an R.M.S. finish of about 2 micro-inches. A few measurements were made with the steel polished with No. 600 Carborundum. The steel was in the form of a ring ¼-inch wide and two inches outside diameter. Normal forces up to 4,000 lb. (2,910 p.s.i.) were provided by a hydraulic press through a self-aligning thrust bearing which rested on plate D. A layer of "Transite" E helped to insulate plate B when measurements were made at high temperatures.

A torque was exerted on the system by hand through a 15-inch lever arm F. Two Baldwin SR-4 strain gauges were attached to the arm to indicate the tangential force. The gauges formed two arms of a Wheatstone bridge connected to a recording potentiometer. The gauges were calibrated by hanging weights on the lever arm at frequent intervals while measurements were being made. The calibration did not change during the experiments. The torque on the system, in inch-pounds, is 15 × pounds force on the lever. The torque, as measured by the strain gauges, is related to the frictional force at the surface of the polymer by the expression.

$$\mu = \frac{42T}{37N}$$

where μ is the coefficient of friction, **T** is the torque in inch-pounds, and **N** is the normal force in pounds. This relation is derived as follows: from the definition of coefficient of friction we have.

$$F = \mu N \qquad (1)$$

where **F** is the frictional force.

To relate the measured torque **T** to the frictional force **F**, consider a circular increment of the steel ring of width **dr**, to which is applied an increment of torque **dT**. Assume that μ is independent of speed, and hence of the radius **r**, and that the normal force is evenly distributed over the sample. The increment **dN** of the normal force acting on the circular element **dr** is therefore the total normal force multiplied by the ratio (area of increment) (total area), or

$$dN = N\frac{2\pi r\, dr}{\pi (r_2^2 - r_1^2)} \qquad (2)$$

where r_1 and r_2 are the inner and outer radii of the steel ring. From (1), the turning force on the element dr is

$$dF = \mu dN$$

The torque due to this force is given by force x distance:

$$rdF = r\mu dN = dT$$

Putting in the expression for dN from (2), we have

$$dT = \mu rN\frac{2rdr}{(r_2^2 - r_1^2)}$$

The total torque for the whole ring is the integral between the limits r_2 and r_1:

$$T = \mu\frac{2N}{(r_2^2 - r_1^2)} \int_{r_1}^{r_2} r^2 dr = \frac{2\mu N(r_2^3 - r_1^3)}{3(r_2^2 - r_1^2)}$$

Putting in our values $r_2 = 1$ inch, $r_1 = \frac{3}{4}$ inch, we have

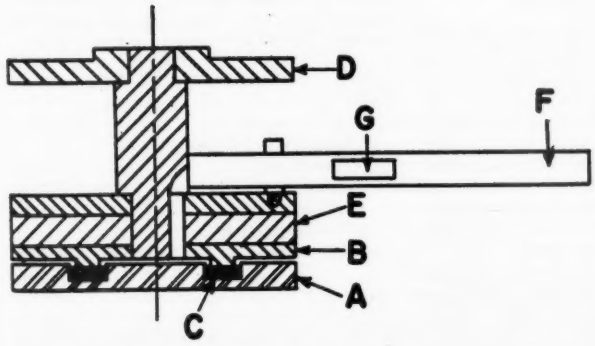
$$T = \frac{37\,\mu N}{42}$$

$$\text{or } \mu = \frac{42T}{37N}$$

An indication of the amount of friction introduced by the thrust bearing was obtained by substituting another thrust bearing for the polymer test pieces: the coefficient of friction of the two bearings was about 0.0003, which is negligible.

The assumptions in the derivation of the formula above, namely, that μ is independent of speed and that the normal force is evenly distributed, require comment. The values reported here were measured at very low speeds, about 1.5 r.p.m. At ½ r.p.m., which was as slow as we could turn the lever by hand without having it stop now and then, the same values were obtained. At speeds of about 10 r.p.m. the value of μ may be slightly higher, but not by much more than the experimental error. For our apparatus, μ is independent of velocity. Shooter found no variation in μ at linear speeds of 0.01 to 1.0 cm/sec.[2a]

With deformable plastics such as Teflon and polyethylene the normal force is more uniformly distributed in our apparatus than in that used by Shooter and by Bowers, who studied friction effects by measuring the force required to move a steel or plastic hemisphere across a plastic or steel plate. With their method, the plastic is deformed



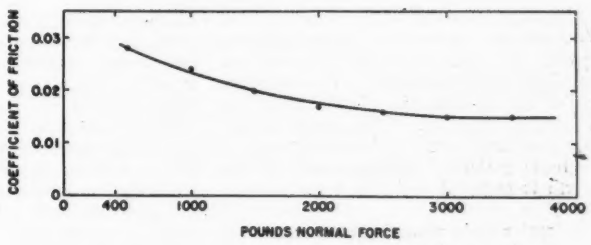


Fig. 2. (Above). Friction *v.* load for Teflon.
Fig. 1. (Left). Test apparatus employed.

TABLE 1. FRICTION TEST RESULTS

Sample	Weight %	Volume %	Coefficient Friction
Unfilled Teflon, dry [a]			0.016±10–15%
Unfilled Teflon, lubricated Silicone Oil, DC 1107			0.006
Fluorocarbon Oil, FCX 331			0.010
Filled Compositions			
MoS_2 [b]	10	4.8	0.016
MoS_2	30	16.4	0.026
TiO_2 [c]	10	5.5	0.013
Asbestos [d]	10	10	0.014
Asbestos	30	30	0.030
Coke Flour [e]	10	10.9	0.017
Coke Flour	20	21.6	0.023
Coke Flour	30	32	0.027
Graphite [f]	30	29.4	0.031
Copper Powder [g]	50	19.8	0.017
Coarse Copper	50	19.8	0.057
Polyethylene			0.09
Polychlorotrifluoroethylene			0.16

[a] Unfilled Teflon ¼" commercially moulded sheeting.
[b] MoS_2 "Molykote" Type M (Alpha Corp.).
[c] TiO_2 "Ti-Pure" LW titanium dioxide pigment (anatase) (Pigments Dept., E. I. du Pont de Nemours and Co., Inc.).
[d] Asbestos Powminco Grade 60.
[e] Coke Flour G.C. 95 Calcined Petroleum Coke Flour National Carbon Division, UCC.
[f] Graphite "Acheson" GP–38 National Carbon Division, UCC (98.5% passes 200 mesh).
[g] Copper Powder Grade MD 151, Metals Disintegrating Company, Elizabeth, New Jersey (60–75% passes 325 mesh).

in a very complicated way, and the normal force exerted by the hemisphere varies from zero to a maximum. Shooter discusses the problems involved with this method of measurement, including the elastic recovery of the plastic after the hemisphere has passed over the sample. It would be of interest to repeat his experiments, using a freely rolling sphere in place of the sliding hemisphere, in an effort to separate the frictional effects from the effects of plasto-elastic deformation of the sample.

Results and Discussions

The following results were obtained for the coefficient of friction against micro-polished steel:

These are all limiting values measured at normal forces greater than 2,000 lb. At lower forces, higher and less reproducible values were obtained. The variation of coefficient of friction with normal force is shown in Fig. 2, in which the data for unfilled Teflon are given. The curve is typical for all materials studied, showing that μ drops at high loads. Shooter found this to be the case for spheres of polytetrafluoroethylene sliding on steel plates, and the reverse for steel spheres sliding on polytetrafluoroethylene sheets.[2c] The deviation from theory in the latter case is accounted for by Shooter's "plowing term" which deals with work of deformation of the plastic sheets.

The value of μ for polyethylene is given for comparison. Our results compare with other values as follows:

Bowers' values labelled "bulk" and "film" represent an experimental test of Shooter's relation between shear strength, yield pressure, and μ for polymers:

μ = shear strength/yield pressure

Bowers altered the yield pressure of polymers by depositing them as a thin film on a relatively non-yielding steel plate and found that μ varied accordingly, although the picture was complicated by transfer of polymer to steel during the experiments. Our apparatus, in which no further compression of the polymer takes place during the measurement of μ, may well give values which represent the limiting case of Shooter's relation. In our experiments it must be remembered, however, that measured values of the coefficient of friction are very sensitive to the surface finish of the steel against which the friction is measured. We found, for example, a value of 0.035 for μ of unfilled Teflon against the steel ring finished with No. 600 Carborundum in a lathe before being micropolished, compared to 0.016 after micropolishing. Because of the effect of surface finish Shooter's, Bowers' and our results may not be strictly comparable. Our low values obtained with the micropolished ring may thus be due to its surface finish or, as suggested above, the low values may represent the limiting case of Shooter's relation.

As for the filled compositions, μ is more dependent on the amount than the type of filler. In fact, it is very likely that the type of filler does not affect results within the experimental error. The high coefficient shown for Teflon filled with coarse (80 mesh) copper powder emphasizes that in extreme cases the nature of the filler particles can grossly affect the results.

The coefficient of friction of unfilled Teflon was found to be constant at 0.016 in the temperature range 25 to 300° C. Values could not be measured at temperatures higher than about 305° C. due to plastic flow of the sample at the high normal forces used.

	Our Values	Shooter's Values [2a] (hemisphere)	Bowers' Values
Polytetrafluoroethylene	0.016	0.10 (steel)	0.10–0.04 (bulk)*
		0.04 (plastic)	0.04 film)
Polyethylene	0.09	0.2 (steel)	0.33–0.25 (bulk*)
		0.15 (plastic)	0.05 (film)

*Static and kinetic coefficients, steel on abraded polymer.

References

1. Present address, Bell Telephone Laboratories, Murray Hill, N.J.
2. a. K. V. Shooter and P. H. Thomas, *Research* 2, 533 (1949).
   b. K. V. Shooter, *Proc. Roy. Soc.* (A) 212, 488 (1952).
   c. K. V. Shooter and D Tabor, *Proc. Phys. Soc.* 65B, 661 (1952).
3. R. C. Bowers, W. C. Clinton and W. A. Zisman, *J. Applied Physics* 24, 1066 (1953); *Modern Plastics* 31, Number 6, 131 (February 1954).

Melamine Resins

By J. WALSH

The following interesting note has been taken from a recent American pamphlet.

MELAMINE resins, the newest of the thermosetting materials, in general have superior properties to the other two but are considerably more expensive. Consumption in 1947 was estimated at 17 million lb., and in 1953, 55 million lb. The growth of this resin has been restricted by a shortage of the basic material, melamine, and future growth is expected to be at a more rapid rate.

Melamine resin moulding compounds are noted for their use in buttons, radio cabinets, electrical parts and dishware. This last product may take up to 80% of total production. Melamine resins have the physical properties to compare with phenolics and the colour possibilities to compare with ureas; therefore they are believed to have a higher growth rate than either. Melamine laminates are used for surfacing furniture, including coffee tables and cafeteria tables, and as interior panelling for kitchens and bathrooms. Annual sales of such laminates are approximately $30 million, and rapid growth is expected as they become popular in home furnishings. Melamine resins are also used for textile treating, largely to impart shrink resistance to wool. Here, again, melamine resins are superior to others in the field, but are most costly. Melamine resins in surface coatings for automobiles, refrigerators, etc., represent an important outlet.

The present end-use distribution is as follows:—

	Per cent.
Moulding materials	29
Laminating	21
Paper treating	20
Surface Coatings	14
Textile treating	13
Adhesives	3
	100

The Properties and Testing of Plastics Materials—Part 2 (Cont.)

Section 4. Impact Strength, Plastic Yield

By A. E. Lever*, A.I.R.I., and J. Rhys†, M.Sc.

Impact strength is discussed, a table being given offering a comparison between the various testing methods. A list of impact strength values is also given.

IMPACT strength is the measure of the work done in breaking a test piece. This indicates the resistance a material can offer to stress concentration.

There is a good discussion on the theory of impact strength[1] which is regarded as a derived property involving both the deformation and breaking properties of the material.

For many practical purposes, where objects are exposed to dynamic influences (shocks), this is more important than tensile strength[2]. This property essentially measures toughness, the practical results deviating widely from theoretical expectations.

Toughness is important in structural engineering, but the term has not been clearly defined. It is bound up with impact strength but this is only a guide, and it is much more a function of strength, elasticity and internal damping. In certain cases it may be defined by the ratio of the square of the tensile strength to the modulus of elasticity.

Notched and plain bars are used, but the former are practically more important.

The majority of machines are of two types: (a) Simple beam (Charpy). (b) Cantilever beam (Izod).

Impact strength represents an attempt to measure the behaviour of material when stressed rapidly, i.e., short-time scale[3] and the theory and testing is usefully discussed[4].

The pendulum test, as applied to plastics, has been copied from the testing of metals but, of course, the mass of the pendulum had to be drastically reduced. Most plastic testing machines have a rated kinetic energy of 2-16 ft./lb.[5] This is ideal for "strong" impact-type plastics (fabric-filled phenolics, glass-fibre laminates), but with lower impact types, the large energy content of a 2 ft./lb. pendulum masks the true strength of these types.

The correct evaluation of the impact strength of these materials demands that the energy rating of the machine only slightly exceeds the impact strength of the material under test. Modifications include falling weights, steel balls, and pendulums of low energy content.

The unnotched test piece is of interest in the study of the mechanics of impact behaviour because of the ease with which it may be mathematically related to fundamental constants. The deviation of single tests from the average of a large number of tests is large.

The notched specimen introduces increased stress of fixed and controlled dimensions, and it closely correlates with service behaviour of commercial objects containing angles, fillets, etc.

At least five specimens should be tested due to the liability of variations beyond those normally encountered in mechanical testing.

Various factors will influence test results[6]:

(a) The dimensions of the test piece.

(b) The notch. Notched specimens are more sensitive than unnotched.

(c) The rate of stressing. Increased rates will increase the impact strength.

(d) The temperature of test.

(e) The Anisotropic effect[33].

The results of impact strength tests with several plastics are reported[7] and the following are some of the theoretical conclusions reached:—

(a) Yield strength increases logarithmatically with the rate of loading. (b) An increase in temperature causes a change in yield strength. (c) Plastic flow cannot occur at velocities greater than the lower critical velocity, which is determined by the first energy drop. (d) Impact strength tests should be performed over a wide range of straining to properly evaluate the properties of the material, and at a temperature to be expected under service conditions. (e) In general, a material must "give" with the blow if it is to have a high impact strength.

The rate of strain factor in relation to the

IMPACT TESTING MACHINES AND SPECIAL FEATURES

Investigator	*Type machine*	*Variables measured*	*Type test piece and deformation*	*Comments*
Albertoni	Pendulum	Absorbed energy as function of strain.	Rod, bar or ring. Tensile.	Mechanical.
Bronschede	Compressed spring and optical beam.	Linear compression as function of time.	Cylinder compressed.	For small deformations.
Brinkman	Falling weight .. Cathode tube recording.	Stress as function of strain.	Rod. Tensile.	
Charpy	Pendulum	Absorbed energy at fracture.	Bar .. .. .. Flexural.	See refs. (13) (14).
Izod	Pendulum	Absorbed energy at fracture.	Bar .. .. .. Flexural.	See refs. (13) (14).
Clark and Datwyler ..	Pendulum	Stress as function of time. Strain calculated.	Rod .. .. Tensile.	Neither stress nor strain const.
Eimendorf	Falling weight ..	Strain as function of time. Stress calculated.	Beam .. .. Flexural.	Neither stress nor strain const.
Ginns	Displaced spring ..	Stress as function of strain.	Rod .. .. Tensile.	Stress and strain not const.
Italiara	Rotating flywheel ..	Shear stress as function of shear strain.	Hollow cylinder .. Shear.	Pure shear.
Korber and Storp ..	Pendulum	Strain as function of time. Stress calculated.	Bar. Flexural.	
Mann	Rotary flywheel ..	Absorbed energy at fracture.	Bar .. .. .. Tensile.	Impact velocity can be varied.
Myers	Rotary flywheel ..	Brittle point as function of velocity.	Bar .. .. .. Flexural.	See ref. (15).
Nadew and Marjorie ..	Rotary flywheel ..	Stress as function of strain.	Rod .. .. Tensile.	Strain rate constant.
Vitman et als.	Rotary flywheel ..	Brittle point as function of temp. or velocity.	Bar. Flexural.	
Welter and Morstu ..	Recorder fall from height.	Stress as function of strain.	Rod .. .. Flexural.	Stress and strain not constant.

* Consultant. † Senior Lecturer in Plastics, National College of Rubber Technology.

impact strength properties of plastics is discussed[8] with particular relation to simpler types of test pieces. A particular case is considered, and it is concluded that at the higher rates of strain the stresses imposed are such that the rate of fracture overtakes the rate of strain.

The theory of plastic strain propagation is reviewed[9] with reference to longitudinal impact. Special equipment for verification of the theory is described. Data is given for metals.

Phenolic materials of impact strength of not less than 0.85 ft./lb. must be tested with a striking energy of 1.0 ft./lb., and those with an impact strength exceeding 0.85 ft./lb. with a striking energy of 3.0 ft./lb. according to one British Specification[10]. An Izod machine is used.

Impact strength increases with increased temperature within the range $-19°$ C. to $+70°$ C.

The various factors which enter into impact strength testing are discussed; e.g., stress distribution, temperature, impact velocity etc.[12] The table on the previous page is quite useful.

A falling weight type of machine is described in the British Specification for moulded electrical materials for use at high temperatures[16]. Another type in which a weight is allowed to fall on to the face of the specimen at the point of intersection of its diagonals, for testing synthetic resin bonded paper sheet is given[17].

A falling ball machine is described[18] which permits the calculation of the energy necessary specifically to rupture the test piece. Balls of various weights are used. It should be remembered that if repeated blows are used, the test becomes a fatigue test.

A magnetic drop mechanism for standard tests on helmet liners has an adjustable drop and a ball weighing 8 lb. A 1-oz. ball is used for testing plastic tableware and the drop is adjustable up to 30 in.[35]

A single blow falling weight machine is used[19] for determining the impact strength of small moulded notched specimens using 20 to 25 gm. of material. By an empirically derived correlation curve, the results may be converted to Izod units.

Charpy Method [13, 14]

A standard test piece is freely suspended at both ends, and is struck in the centre by a weighted pendulum (simple beam).

Izod Method [13, 14]

A standard test piece is rigidly supported at one end only and is struck at the other end by a weighted pendulum (cantilever beam). Either a notched or unnotched specimen may be used, although the former is more usual. The results obtained do not bear any direct relation to one another. A study of the sources of variability when using this machine has been reported[20].

A recognized source of error in testing low-strength plastics and electrical insulating materials of different densities by the Izod method is the "toss factor." This is that part of the pendulum energy concerned in tossing away the broken half of the test piece.

A machine is described[21], similar to the Izod, but utilizing the principle that, if the specimen is in motion, it will contain the kinetic energy to toss itself, and such energy will not appear as an error in the impact strength readings. A bibliography on this point is given.

This is also discussed, with data[22], where the Maxwell and Rahn machine is used. See also [23].

Both these machines can be used for measuring impact strength of plastics at low temperatures[24].

Izod impact strength of laminates and thermosetting moulding compounds at low temperatures has been determined[25]. The following results were found:—

Laminates	Impact Strength
Paper-phenolic and asbestos flock	Small decrease
Cotton fabric phenolic laminate and rod ...	Large decrease
Glass fibre—silicone ...	Small increase
Glass fibre—silicone—melamine rod. Glass fibre melamine, glass fibre polyester ...	Large increase

The Hounsfield Impact Test Machine [26]

This is primarily designed to measure the work done in breaking a notched test piece, but an unnotched piece may be used, and this gives results more nearly proportional to its tensile strength.

Notched bar tests, on various sized test pieces, bore no constant relation to the area of the section, and from this it follows:—

(a) All test pieces must be the same size for comparative purposes.

(b) The cross-section of the test piece should be so chosen as to be representative of the average thickness of the manufactured product.

A small test piece is used, $\frac{5}{16}$ in. dia., the notch $\frac{1}{8}$ in. deep; leaving $\frac{3}{16}$ in. at the root of the notch. It is usually moulded to the dimension required. The energy, in ft. lb., is read from a table provided.

The Myers Rotary Flywheel Impactometer[15]

This machine was used to investigate the effect on impact strength of varying the speed. Essentially it was developed for testing sheet. There is no correlation with notched Izod values, but the results agreed well with service performance. It is suggested that the results obtained with this machine indicate the existence of impact strength as a separate and fundamental property of plastic materials.

Differences in properties between parts of a single moulded piece led the Germans to develop a method of testing very small specimens (0.4 in. × 0.6 in. × 0.06 in. to 0.16 in.) using the **Dynstat** machine.[27]

Another machine for measuring the impact strength of small specimens (1 in. × 0.1 in. to 0.2 in.) is described. [28]

A guillotine machine is described[23] which eliminates the difficulties inherent in the Izod type machine due to the "broken half" and "shearing and tearing" errors.

An instrument[29] for determining elongation during impact load as a function of time is very similar to the **Beach Punch and Stiffness Tester**[30] and is used for determining puncture resistance and stiffness of paperboard.

A falling-ball method was used[31] to measure the resistance to impact of table tops. Specimens, 6 in. square, were cemented to like pieces of aluminium sheet ($\frac{1}{16}$ in. thick). The assembly was held firmly on a horizontal steel plate and a 2 lb. steel ball was dropped onto the centre from a height of 8 ft. Assessment was made on a visual basis, e.g., "slight indentation," "Puncture $\frac{1}{16}$ in. radius from point of impact," etc.

Diagrammatic schemes for impact-fatigue tests, where the article or test piece is repeatedly struck by a weight until it fails, is given.[35]

A transmitted shock test is briefly described.[35] The apparatus consists of a pendulum or striker arm, adjustable to give blows of various magnitudes, a supporting frame and an anvil on which to mount the specimen. Single or multiple blows can be delivered.

Plastic Yield

This is measured as the total deformation of a bar-shaped test piece of given dimensions, stressed under given conditions, i.e., cantilever loading, at a given temperature for a given time.[32]

A moulded, or carefully shaped, beam of

MECHANICAL PROPERTIES OF PLASTICS—IMPACT STRENGTH.

	Impact strength ft. lb./in. notch	
	Izod	*Charpy*
Phenol formaldehyde:		
Type G	0.2	0.3
Type MS	0.3	0.5
Type HS	1.0	4.0
Type HR	0.3	1.0
Phenol formaldehyde laminates:		
Paper	—	1.0
Fabric	—	4.0
Cast phenolics	—	0.5
Urea formaldehyde:		
Paper filled	—	0.3
Wood filled	—	0.3
Urea formaldehyde laminates:		
Paper	—	0.6
Fabric	—	1.0
Melamine formaldehyde	—	0.4
Melamine formaldehyde laminates:		
Paper	—	0.7
Fabric	—	1.0
Polyesters:		
Unfilled	0.2–7.0	—
Polyester glass laminate:		
Rovings	—	70
Cloth	—	25
Mat	—	20
Cellulose nitrate	—	5.0
Cellulose acetate	—	3.0
Cellulose acetate—butyrate	—	4.0
Ethyl cellulose	—	1.0
Polythene	16	—
Polytetrafluorethylene	4	—
Polyvinyl chloride (P.V.C.):		
Rigid	10	
Plasticised	—	
Polyvinyl chloride—acetate:		
Rigid	0.6	
Plasticised	—	
Polyvinylidene chloride	1.0	
Polystyrene	—	1.0–2.0
Polystyrene (and alloys):		
High impact	10	—
Polymethylmethacrylate	—	0.4
Nylon moulding powder	—	2.0
Nylon filaments	—	—
Silicones (elastomeric)	—	—
Natural rubber	—	—
Hard rubber	0.27–1.0	—
Shellac	2.5	—
Casein	1.0	—
Steel	—	45
Aluminium	—	20

the material is fixed at one end, and a weight supported in a stirrup suspended at the other. After heating at the stated temperature for the given time, the deflection of the stirrup is measured.

Electrical insulating materials are classified into grades according to the highest temperature at which a yield of a standard test piece remains below 5 mm. This is known as the "yield temperature."

Ebonite is covered by British Specification[32] and phenolics by [10].

Moulded electrical materials for use at high temperatures are tested at 180° C. with a load of 450 gm. for 6 hours.[16] The difference between the initial height and the final heights is expressed in millimetres. The qualifying limit is 5 mm.

References

1. The Strength of Plastics and Glass, Cleaver-Hume Press, 1949.
2. Fundamentals of Synthetic Polymer Technology, Elsevier Pub. Co. Inc., 1949.
3. Symposium on Plastics, A.S.T.M., 1944.
4. *Trans. A.S.M.E.*, 1952, **74,** 579.
5. Fundamentals of Plastics, McGraw Hill, N.Y., 1946.
6. *Mod. Plast.*, Apr., 1945, **22,** 145.
7. *Mod. Plast.*, 1953, **30,** No. 9, 140.
8. *Plastics* (Lond.), 1953, **18,** 382.
9. *A.S.T.M. Proc.*, 1947, **47,** 502.
10. B.S. 771, 1938.
11. *Mod. Plast.*, July, 1945, **22,** 145.
12. *Ind. Eng.*, 1945, **37,** 255.
13. *Plastics* (Lond.), 1948, **12,** 470 and 528; and 1949, **13,** 15.
14. A.S.T.M. Spec. D., 256-43T, and U.S. Fed. Spec. L.P.406 Method 1071.
15. *Mod. Plast.*, 1942, **19,** 81.
16. B.S. 1539, 1949.
17. B.S. 1323, 1946.
18. A.S.T.M. Bull., Oct., 1944, 21.
19. Ibid., 1951, No. 177, 48.
20. Ibid., 1951, No. 173, 48.
21. Ibid., 1954, No. 195, 61.
22. Ibid., 1949, No. 161, 44.
23. *Br. Plast.*, 1942, **13,** 445 and 506.
24. A.S.T.M. Spec. D., 758-48.
25. A.S.T.M. Bull., 1952, No. 181, 67.
26. Tensometer Ltd., Croydon, Pub. No. 142/45.
27. Elastomers and Plastomers, Elsevier Pub. Co. Inc., N.Y., 1948.
28. A.S.T.M. Bull., 1946, No. 140, 50.
29. *Kunststoffe*, 1953, **43,** 181.
30. A.S.T.M. Spec. D., 781-44T.
31. *Mod. Plast.*, 1950, **28,** No. 2, 111.
32. B.S. 903, 1950.
33. *Trans. P.I.*, 1954, **22,** No. 49, 220.
34. *Mod. Plast.*, 1943, **20,** No. 11, 85.
35. Plastics Eng. Handbook, SP.I., 1954 (U.S. Spec. Mil., 901).

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. The country of origin for Convention Applications is shown in parentheses. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 3s. 0d. each (including postage).

B.P. 725,948. Illuminated signs and the like. Brit. Transport Commission, R. Dell.

The frustum of a cone of transparent material, glass or thermoplastic, deflecting the light by internal reflection, is used for direction indicators receiving illumination from fluorescent tubes.

B.P. 725,950. Microporous battery separator and method of making same. To: B. F. Goodrich Co. (U.S.A.).

Directly made from powdered or granular vinyl resin by rolling pressure and heating (sintering), leaving 40-55% intercommunicating voids.

B.P. 725,951. Production of copolymers from drying oil and styrene. To: Scado Kunsthars Industrie N.V. (Netherlands).

B.P. 725,973. Method of and apparatus for producing granulated synthetic material. To: Buss A.G. (Switzerland).

The material is passed through rollers with peripheral grooves so arranged that a groove of one roller is always opposite a wider flat or like profile between two grooves of the other roller. The profiled ribbon formed has adjacent longitudinal ribs projecting alternately. The ribbon is cut transversely at intervals.

B.P. 726,016. Tampons for treating disorders of the rectum. P. Kramer (Switzerland).

The support is moulded from a plastic material.

B.P. 726,039. Means for securing handles to metallic containers or parts of containers. W. Fritsch, P. Fritsch, O. Fritsch, E. Fritsch (Fritsch and Co.) (Germany).

Handles from moulded insulating material are secured to pressure cookers by means of perforated straps on the handles using heat-insulating plastics nuts to screw the straps to threaded rings riveted to the cooker.

B.P. 726,098. Food Packs. J. H. Johnson, H. K. Johnson, B. B. Johnson.

Polythene ("Pliofilm") is used as a single sheet or laminated, e.g., with "Cellophane" around pickled vegetables in a preserving liquid.

B.P. 726,145. Sealing closures for containers and method of producing same. E. O. Aichele, J. J. Mascuch.

An interior sealing liner is composed of polyvinyl chloride and dicyclohexyl phthalate prepared from a powdered composition placed in the closure cap, which is then heated and shaped (by plunger or die).

B.P. 726,162. Foam dispensing head for an aerosol container. R. H. Abplanalp (U.S.A.).

For toilet cream, toothpaste, shaving cream, soap as an attachment to a container or as part of the container. It has a tiltable actuator operating a valve, which first slides from a retracted position to a position where it can be tilted by manual pressure so as to preclude inadvertent use. The several parts of the head are moulded from organic plastics.

B.P. 726,193. Brushes. To: Ets. L. Salvy et Fils Soc. à r.l. (France).

A hair brush made from polystyrene (handle and body) and "Alkathene" (brushing elements and mounting).

B.P. 726,202. A combined cigarette receptacle and lighter. J. Zaidener, S. Zaidener, D. Zaidener.

The receptacle is moulded from plastic material.

B.P. 726,209. Hair brushes. L. R. Bressler.

The head portion with the bristles is made resilient by being made up of bristle-carrying sections moulded around non-metallic Nylon spring members.

B.P. 726,222. Method of manufacture of shell-cases and other containers of like shape. To: Forces et Ateliers de Constructions Electriques de Jeumont (France).

A wound-up tube on a base both of which may be made of plastic material.

B.P. 726,291. Method of manufacturing thermoplastic pellets. To: Standard Oil Development Co. (U.S.A.).

A plurality of hot rods are extruded lying close together. These rods are passed through cool pinch rolls with small ribs flattening the rods at intervals so that the rods are connected at these points. The free end portions are then transversely severed successively to form individual pellets.

B.P. 726,334. Model Railway Track. G. A. W. N. Slater.

B.P. 726,426. Spools for packing materials in strip form. R. Röhm (Fritz Müller K.-G.) (Germany).

A hollow tubular core with plates on each side secured to the core with flanges projecting inwardly into the core so that they can be used with different core lengths.

B.P. 726,433. Textile bobbins. To: Hercules Powder Co. (U.S.A.).

Moulded from ethyl cellulose modified with coumarone-indene resins, phenol-aldehyde resins or petroleum hydro-carbon-insoluble pine wood resin. Such plastic bobbins are hard enough to withstand the pressure of the thread.

B.P. 726,472. Bag and method of forming same. H. L. Bartelt, D. E. Bartelt (U.S.A.).

A special method of folding a strip of material coated on one side with a thermo-sensitive substance so as to form two double-walled flaps, making a narrow seal and joining opposed edge portions of the bag panels and of each flap together. The thermo-sensitive material permits fusing under heat and pressure.

B.P. 726,509. Electric insulated cables. L. Mole, J. Dutton. To: Greengate and Irwell Rubber Co., Ltd.

Layers of polyethylene terephthalate are used in the form of a fabric ("Terylene") varnished with a synthetic resin varnish.

B.P. 726,517. Electric dry cells and method of making same. A. Szundy (Brazil).

A container of thermoplastic material moulded with a zinc lining and strip inlaid in the material.

B.P. 726,520. Crown closure. F. Wolff (Denmark).

Sealing element of polyethylene arranged to be plastically deformable at room temperature under closing pressure.

B.P. 726,567. Laminated structures comprising glass cloth and particulated mica. To: Dow Corning, Ltd. (U.S.A.).

Organopolysiloxane resins are used as bonding materials.

B.P. 726,570. Epoxy resin and polyamide compositions. To: General Mills Inc. (U.S.A.).

B.P. 726,577. Plasticized vinyl chloride polymer compositions. To: E. I. Du Pont de Nemours and Co. (U.S.A.).

A flexible composition to which commercial printing inks will adhere and which has certain desirable bookbinding properties.

B.P. 726,587. Fluorescent screen for radiography. F. J. Bailey. To: Ilford, Ltd.

Patches of self-adhesive material on the back of the film are covered with a layer of polyvinyl acetate or polyethylene readily pulled away when placing the film in the cassette.

B.P. 726,613. Dressmakers' aid. R. Towers (South Africa).

For marking out, with lower and upper arm. Transparent plastics for the upper arm.

B.P. 726,629. Container for a cigar or cigarette holder. V. F. Trombotto, T. M. Capra.

With hood and clip like a fountain pen.

B.P. 726,651. Method of and apparatus for drying tubing. S. J. Wakefield. To: Visking Corp.

A dielectric method for drying regenerated cellulose sausage casings.

B.P. 726,657. Impregnated sheet materials and compositions suitable for use in preparing the same. B.B. Chemical Co., Ltd., A. M. Hall, E. H. Walton.

Preparation of motor vehicle upholstery with an impregnating composition comprising rubber and "Bakelite."

B.P. 726,667. Synthetic resin compositions. W. H. Hogg, T. R. Evans. To: Dunlop Rubber Co., Ltd.

Based on vinyl chloride and vinylidene chloride and containing a plasticizer and one or more amines (alkylene polyamines). For extrusion, for lining tanks, etc.

B.P. 726,671. Medallions or other ornamental or indicative articles made from transparent plastics and having a metallic coating thereon. H. C. Castell. To: Wilmot-Breeden, Ltd.

Aluminium bronze evaporated in a vacuum after the article and the vacuum chamber have been cleansed by high-tension electrical discharge.

B.P. 726,687. Sheet metal containers. James G. Carrick and Co., Ltd., G. C. Carrick.

To prevent damage or collapse of the polythene liner when emptying the container, the liner is applied as a bottom sheet and a tubular portion secured by a double-seamed joint so that the foot of the tubular liner and the bottom sheet are embedded together in the joint.

B.P. 726,688. Sealing members for containers. R. Detsiny.

A polythene disc of special shape.

B.P. 726,690. Method of bonding plastics parts together. To: Lonza Elektrizitätswerke und Chemische Fabriken A.G. (Switzerland).

Polymethyl-methacrylate parts are bonded by swelling one or both of the surfaces to be bonded with a solution of trichloracetic acid and then pressing the parts together.

B.P. 726,694. Synthetic resinous compositions for coating metals. To: Dow Corning Ltd. (U.S.A.).

A silico-alkyd resin product (20-82%) and an alkylated melamine-formaldehyde resin or an alkylated urea-formaldehyde resin (18-80%).

B.P. 726,706. Heart catheters. W. Ruesch (Willy Ruesch K.G.) (Germany).

Tubes of very small diameter are needed which hitherto have been manufactured of fabric coated with lacquer. The new catheter is made from polyvinyl chloride extruded or sprayed over a wire.

B.P. 726,713. Composition containing a glycicyl polyether and a polyvinyl acetal resin. To: N.V. de Baetaafsche Petroleum Maatschappij (U.S.A.).

As surface coating material and also in adhesive formulations.

B.P. 726,739. Shell moulding. To: Ford Motor Co. Ltd. (U.S.A.).

Two shell lamina are prepared from sand-resin (thermosetting) mixes, one next to the core to give a smooth surface, the outer coarser lamina to give mechanical strength.

Industry's Part In Surgery

(An extract from a report recently issued by the General Electric Company Ltd.)

THE use of metals and plastics in the treatment of injury or disease has now an established place in various fields of surgery. They are used for a variety of purposes, inside and outside the body. It is, however, in the field of orthopædics that they have been used most extensively, as for example in the replacement of parts of the skeleton, in the repair of joints, in the treatment of fractures and for the manufacture of splints, artificial limbs and respirators.

At the Royal National Orthopædic Hospital, the applications of metals and plastics are being studied by the Plastics Research Unit at Stanmore. As the materials used are industrial products, surgical techniques employing these materials can only be developed if the knowledge and the resources of the industries which produce and manipulate them, can be collated and related to the surgical problem. In order to elucidate the many engineering problems now confronting the surgeon which have a bearing on the biological responses of the tissues, the Plastics Research Unit of the Institute of Orthopædics, and the Faculty of Engineering, King's College, University of London, are carrying out joint research.

A material that is to be used in contact with the surface of the body or embedded in the tissues must be biologically compatible, that is it must not be irritant to the skin or tissues, nor must it be affected by body fluids. Further, it must have the necessary mechanical properties for its particular purpose. It must also be light in weight and easily fashioned to the required shape.

With the development of chemotherapeutic agents, such as sulphonamides and penicillin, and recent advances in the technique of anaesthesia, it has become possible to perform extensive surgical replacements of portions of bone and tissues affected by disease. In certain instances the patient with an arm or leg, which in the past would have been amputated, because of a destructive lesion of the bone, can now have the part removed and replaced by a man-made substitute. Although at first sight it may seem a simple matter to design the implant for the surgeon, many factors have to be taken into account: the chemical and physical properties of the implant, the action of tissue fluids and the stresses to which the implant will be subject in the body need to be known before it can be used with safety in man. For example, an implant which is to be used in a joint has to withstand constant wear for many years. It must not abrade, as the consequent particulate matter might produce undesirable tissue reactions causing destruction of the bone with which it is in contact. A man-made component of a joint may be subject to fatigue stresses which may cause failure of the implant if it has not been designed to withstand these forces. The surgeon also requires to have a knowledge of the mechanics of the operative procedures, as failure to insert the implant in the best position may subject the implant to undue stresses which may either cause failure of the structure, or absorption, or fracture of the patient's bone. Even when a suitable material has been decided upon, its fashioning often presents a host of problems. If plastic materials are used, industrial knowledge of moulding techniques and manipulation of the resin are of vital importance. With metals, particularly cobalt-chrome alloys which are now widely used, the lost wax technique has to be employed and here again the information gained, from those who are more usually concerned with the manufacture of jet turbine components, can be of immense help.

To mould thermoplastic materials for experimental purposes and routine manufacture of orthopædic appliances (such as leg and arm splints, spinal jackets and neck collars which, for example, are used in the treatment of infantile paralysis and tuberculosis of bone), G.E.C. infra-red heating equipment has been installed. The plant, specially constructed by The General Electric Co., Ltd., has a horizontal bank of 64 250 w. Osram infra-red reflector lamps mounted in aluminium-alloy reflector units, radiating downwards on to a flat bed. The heating space is surrounded by doors with inner reflecting surfaces to permit the insertion of the material from any side. Complete enclosure of the heating space prevents heat losses from stray radiation and the cooling effects of air currents. An adjustable bed is provided so that the intensity of radiation can be altered as required and the grid can be removed from the plant to allow a complete casting of the body to be moved in if the plastic sheet needs softening on the mould. Various sections of the plant are wired to individual switches. The plant also has two time controls and an energy regulator. One timer is set for the total time and automatically switches the plant off after the heating period; the other timer brings into circuit the energy regulator which, to allow the plastic sheet to soak at constant heat, automatically switches certain of the lamps on and off once the surface is at temperature.

VACUUM in PLASTICS . . .

Vacuum "metallizing" is a widely established economical process for imparting glittering "sales-appeal" finishes to consumer articles or utility surfaces to meet scientific and industrial requirements. EDWARDS have pioneered many valuable contributions both in plant design and coating techniques covering static and continuous coating. New vapour pumps give greatly reduced pumping times.

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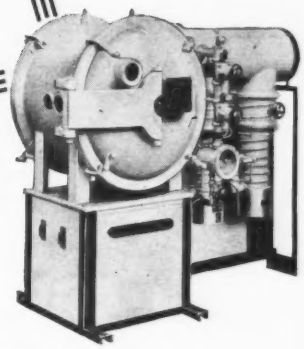

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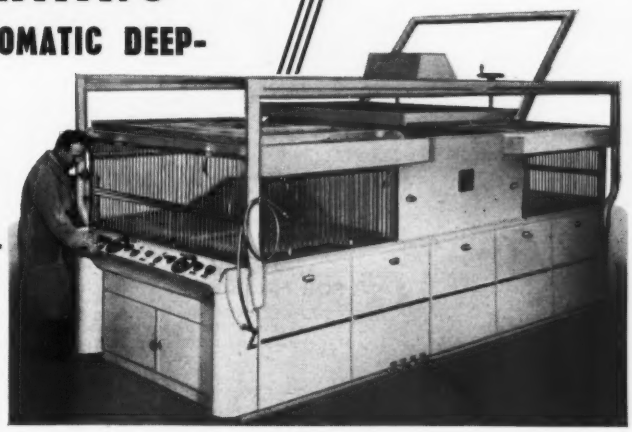

A junior development in the plastic moulding industry, the VACUUM forming of thermoplastic sheets shows signs of soon becoming a GIANT!

The needs either for large production runs or, a "few off" are all met by the range of automatic deep-drawing and drape forming machines now being manufactured by EDWARDS in association with HYDRO-CHEMIE LTD., of Switzerland.

Illustrated is a "FORMVAC" twin-table model which handles plastic sheets 43" x 63".

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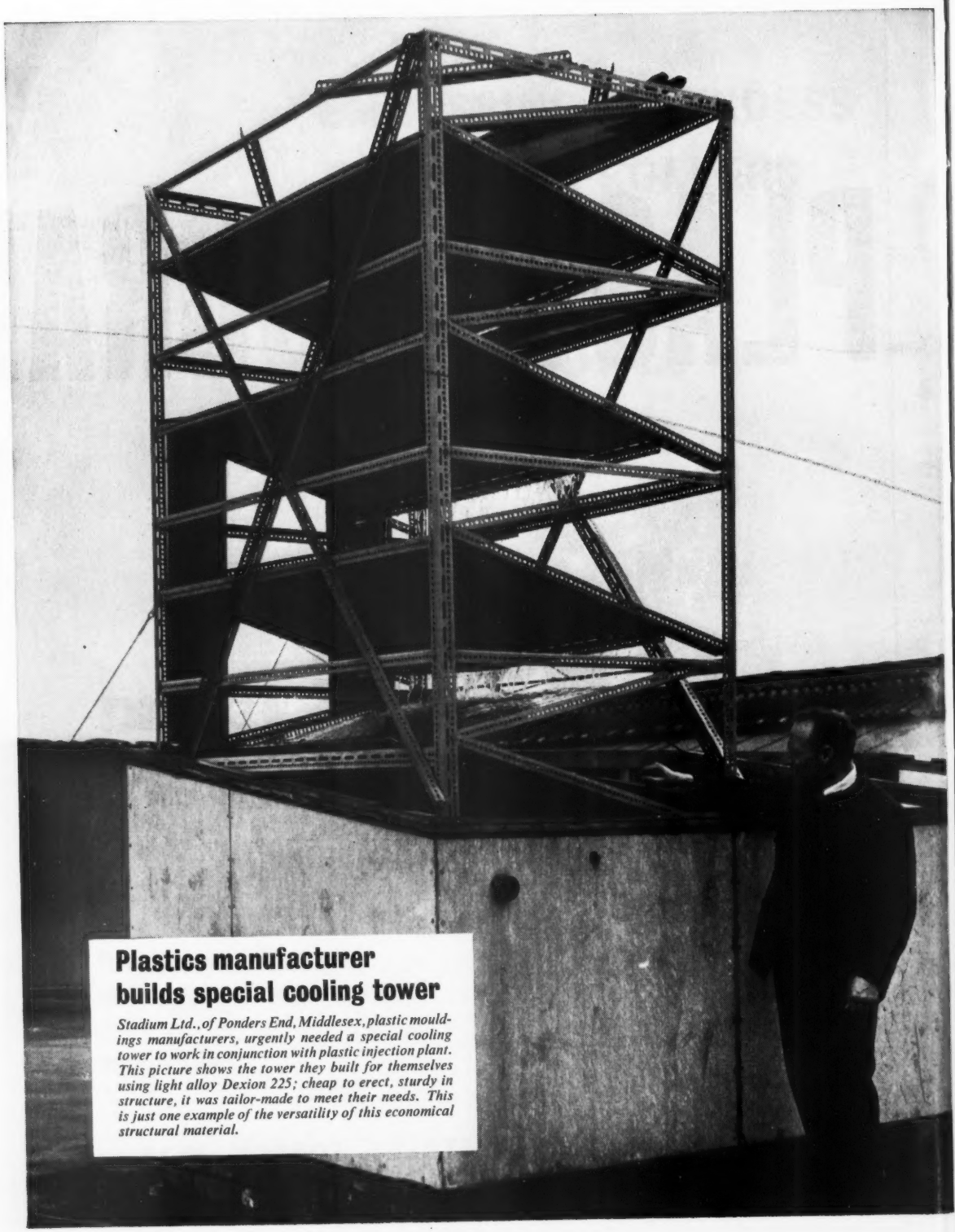


Plastics manufacturer builds special cooling tower

Stadium Ltd., of Ponders End, Middlesex, plastic mouldings manufacturers, urgently needed a special cooling tower to work in conjunction with plastic injection plant. This picture shows the tower they built for themselves using light alloy Dexion 225; cheap to erect, sturdy in structure, it was tailor-made to meet their needs. This is just one example of the versatility of this economical structural material.

EQUIPMENT—

quickly, cheaply, strongly, *exactly as you want it*—with versatile DEXION slotted angle

FOR almost any kind of works or storage equipment you may need — storage racking, machine stands, trolleys, work-benches, maintenance platforms, and a hundred other items — you'll find Dexion Slotted Angle the sturdiest, cheapest, most versatile material.

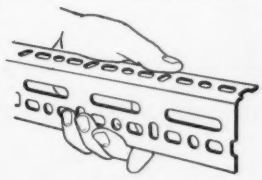
Dexion is far easier and quicker to work with than wood or angle iron. It merely needs cutting and bolting together — no precise measurements or detailed drawings, no drilling or welding, no skilled carpentry, no painting. *The work has been put into it already*, so that unskilled labour can handle any job. You get exactly the structures you need, without delay, and generally at a big saving.

Dexion is scientifically designed so that every slot and hole has a function, and the remaining metal is left where it gives greatest strength. It *continues* to save you money, because any Dexion structure can be swiftly altered or dismantled and the Dexion used again. There is no waste, no scrap.

Dexion is the Slotted Angle that started an industry. Now, over 75 million feet are being used by more than 45,000 firms all over the world. *And 80 per cent of Dexion sales are repeat orders.*

GET THE FACTS

Dexion 225 is sold in packets of ten 10-ft. lengths, complete with bolts. Steel Dexion *(price from 1/3½ to 1/5 per foot)* is rust-protected, stove enamelled. Where a light but strong, non-magnetic, non-corroding material is required, use Alloy Dexion (full technical details and prices on request). Dexion Service offers advice or design assistance on any problem, and construction teams are available. Send today for sample piece of Dexion and booklet AB. 131 illustrating uses in many industries. Dexion Ltd., 65 Maygrove Road, London, N.W.6. (Telephone: MAIda Vale 6031-9.)



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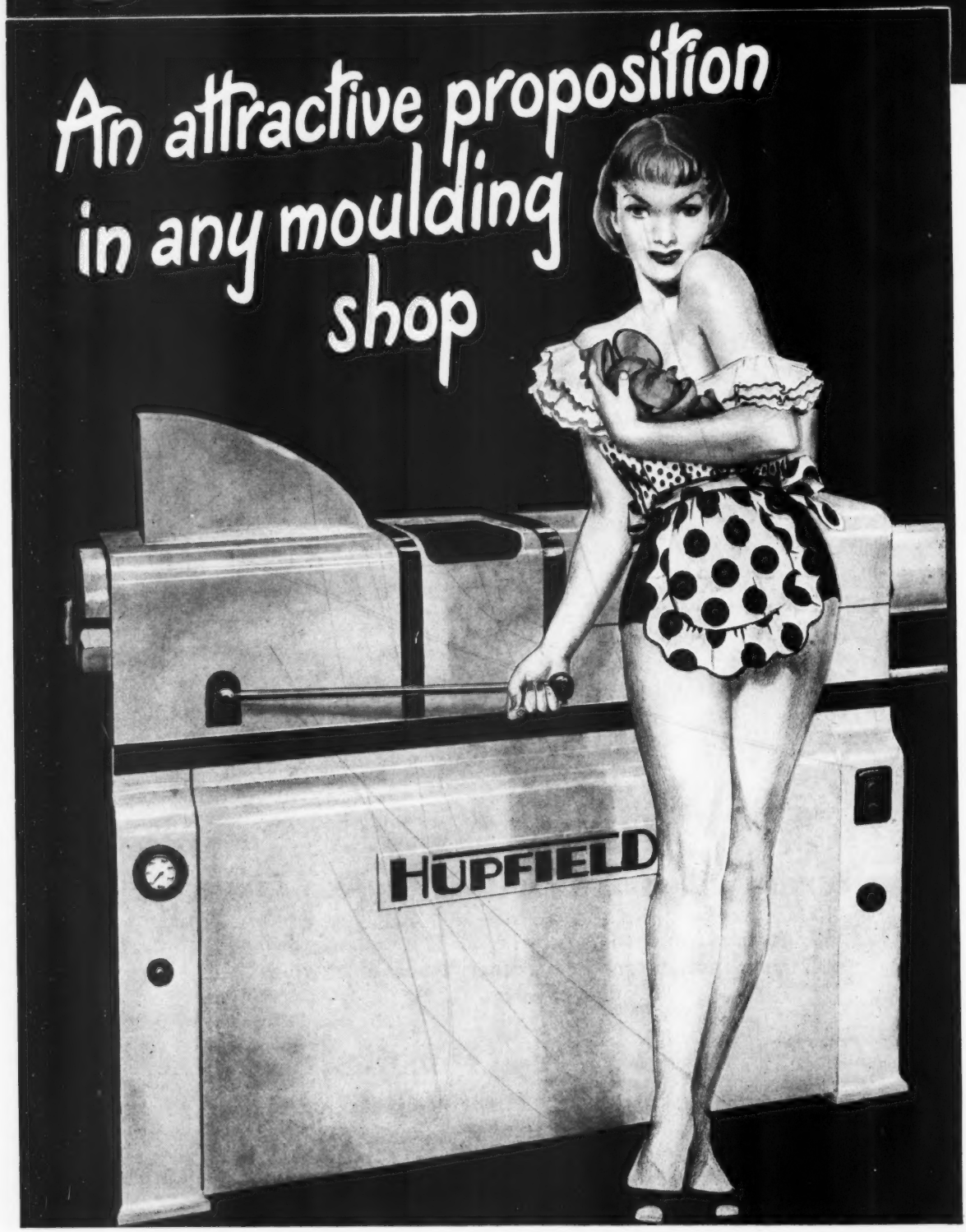

MOULDING MACHINES

Note and compare this specification.

SPECIFICATION. BASED ON POLYSTYRENE	1-oz. MACHINE	2-oz. MACHINE
Price standard machine	£720	£990
Price machine fitted for moulding nylon	£755	£1,025
Maximum operations. Dry run	520 per hour	480 per hour
Full 1-oz. or 2-oz. shots can be moulded consistently. (Subject to mould design)	at 17 sec. cycle	at 17 sec. cycle
Moulding area. (Subject to mould design)	12 sq. ins.	22 sq. ins.
Plasticizing capacity per hour	14 lbs.	30 lbs.
Diameter of injection plunger	1¼"	1⅝"
Area of injection plunger	1.23 sq. in.	2.07 sq. in.
Stroke of injection plunger in cylinder	6½"	8"
Total injection pressure with standard ram	10,250 P.S.I.	12,120 P.S.I.
Mould locking pressure (hydraulic)	22 tons	44 tons
Mould opening	5⅝"	7"
Heating unit consumption	1,200	2,000
Motor 400/440 volt A.C. 3-phase, 50 cycles	3 H.P. 1,440 R.P.M.	6 H.P. 960 R.P.M.
Hydraulic pump	Vickers V-105-A	Plessey. 3 H58 CX
Size of base	4' 8" x 1' 10"	5' 8" x 1' 10"
Overall height	4' 3"	4' 5"
Net weight	15 cwt.	23 cwt.
Shipping weight	18 cwt.	27 cwt.
Shipping dimensions	6' 1" x 2' 5" x 4' 5"	7' 3" x 2' 5" x 4' 9"
Hydraulic system—oil	20 gal. capacity	26 gal. capacity

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Heating cylinder chrome plated for P.C.V., etc.
Variable injection pressure with full mould locking pressure.
Independent sustained hydraulic locking pressure.
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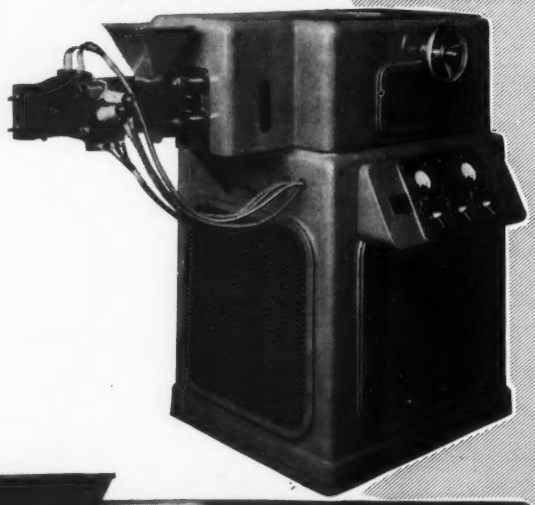
manufactured at Varese, Italy, for producing moulding powder granules, rods, tubes and various shapes and sections in plastic materials.



Illustrated on the right is the patented twin screw Pasquetti Extruder.

Nominal capacity: 8-40 lbs. per hour (depending on material and type of extrusion).

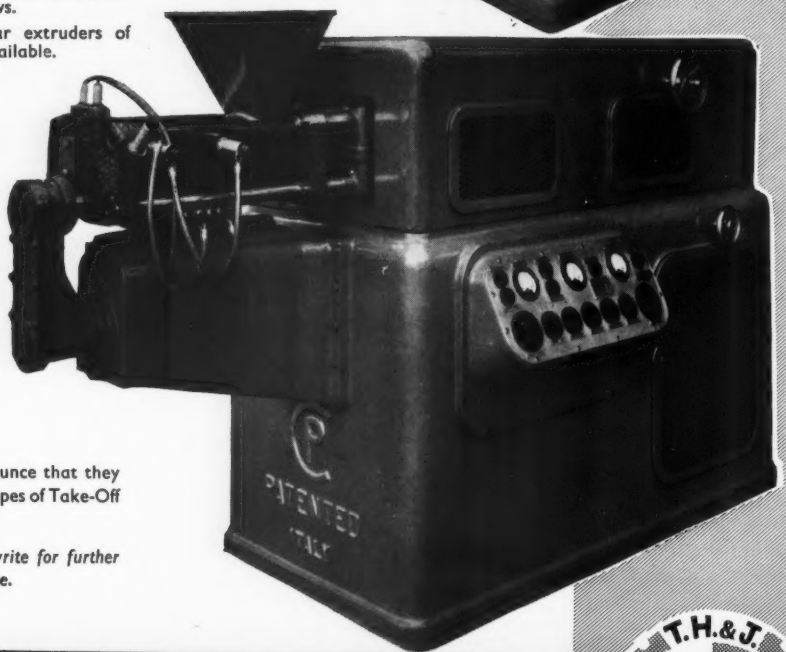
Motor: 1.6 h.p. Fitted with protected starter and overload release.

Electrical heating: By Variac control.

Screws: Two $1\frac{7}{8}$" diameter. Hardened nickel-chrome steel screws, each in two sections having four and two starts respectively.

Illustrated below is a much larger model with a capacity of 44-133 lbs. per hour (depending on material and extrusion) and with two 3" diameter screws.

Patented bi-helicoidal gear extruders of larger capacity are also available.



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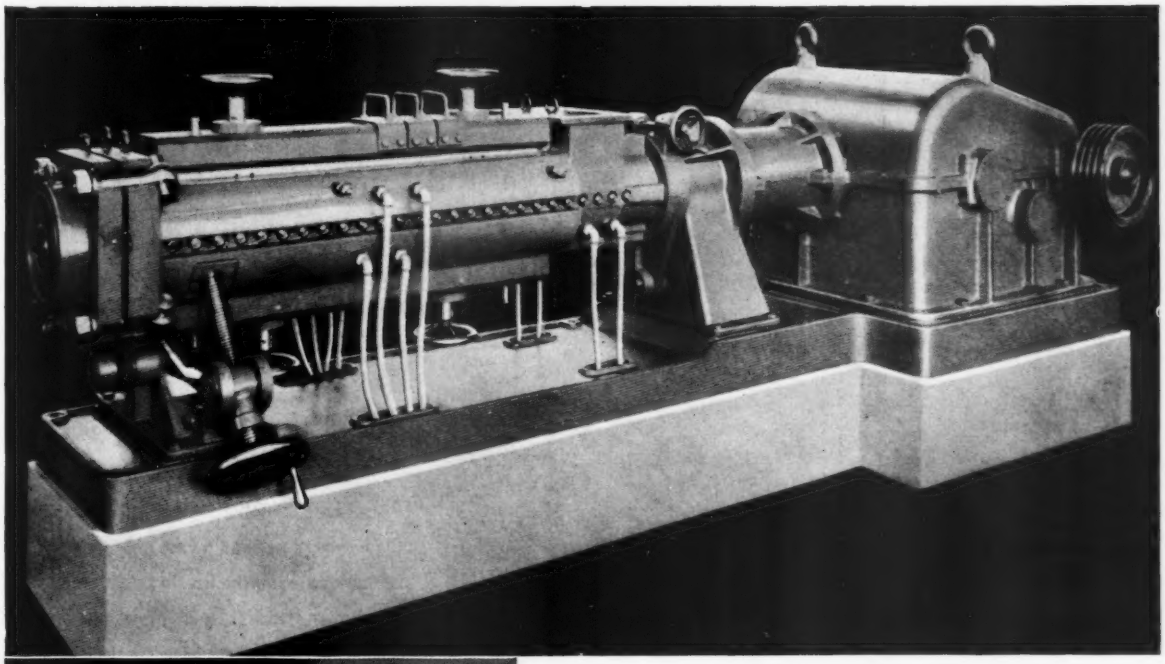

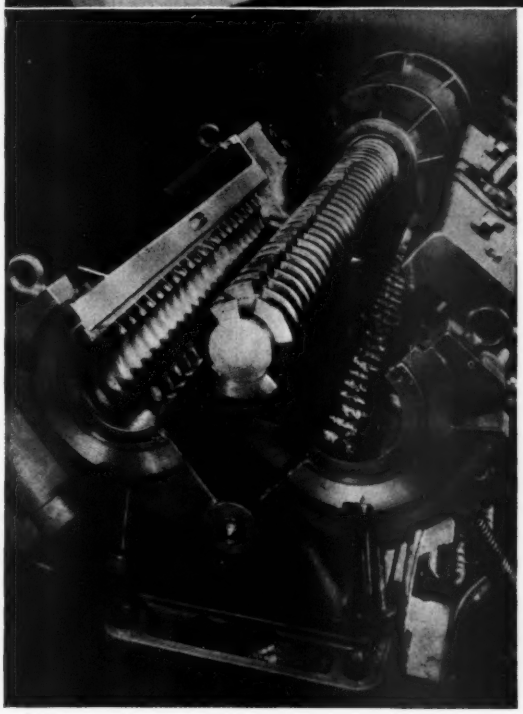

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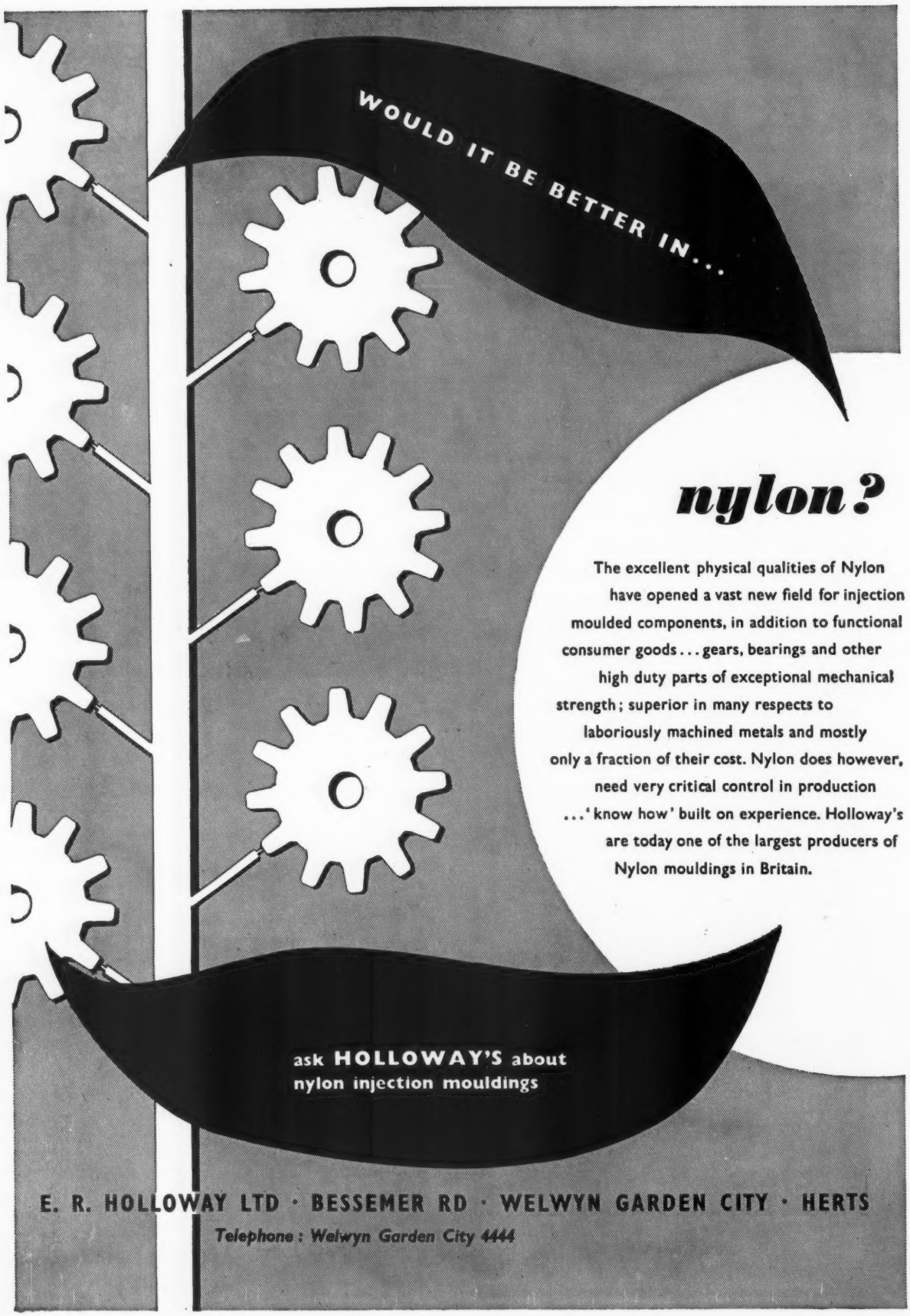
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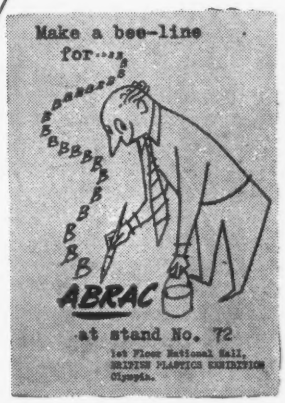

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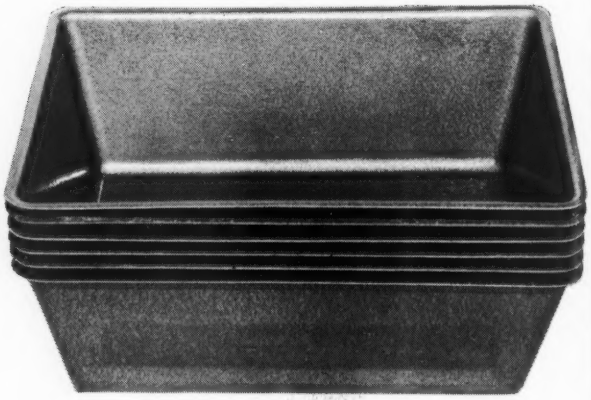

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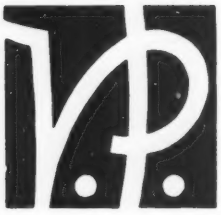

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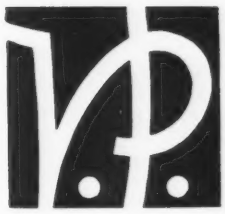

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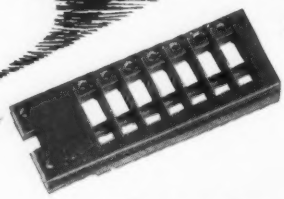
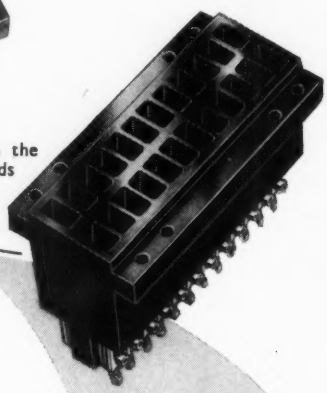


A moulding that reflects the high engineering standards called for by the B.B.C.



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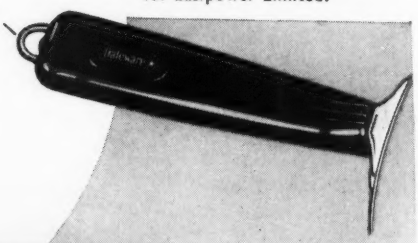

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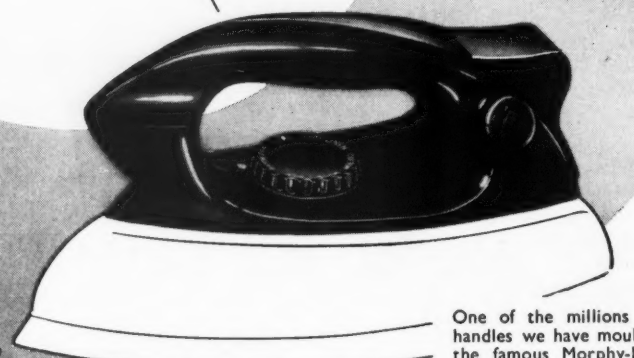

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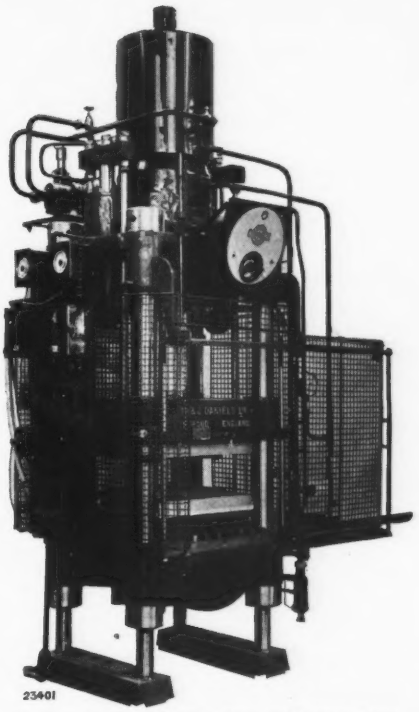
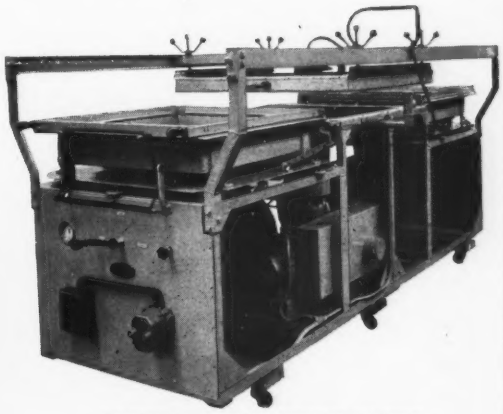


DANIELS 150-TON DOWNSTROKE MOULDING PRESS



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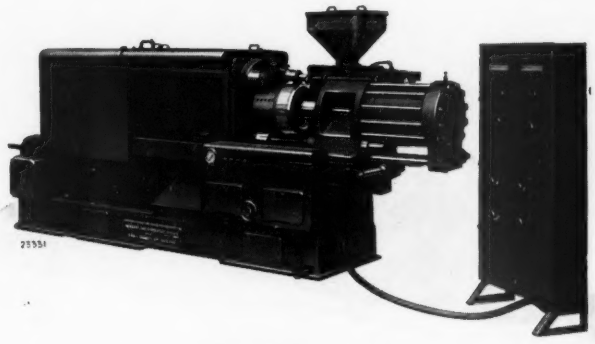

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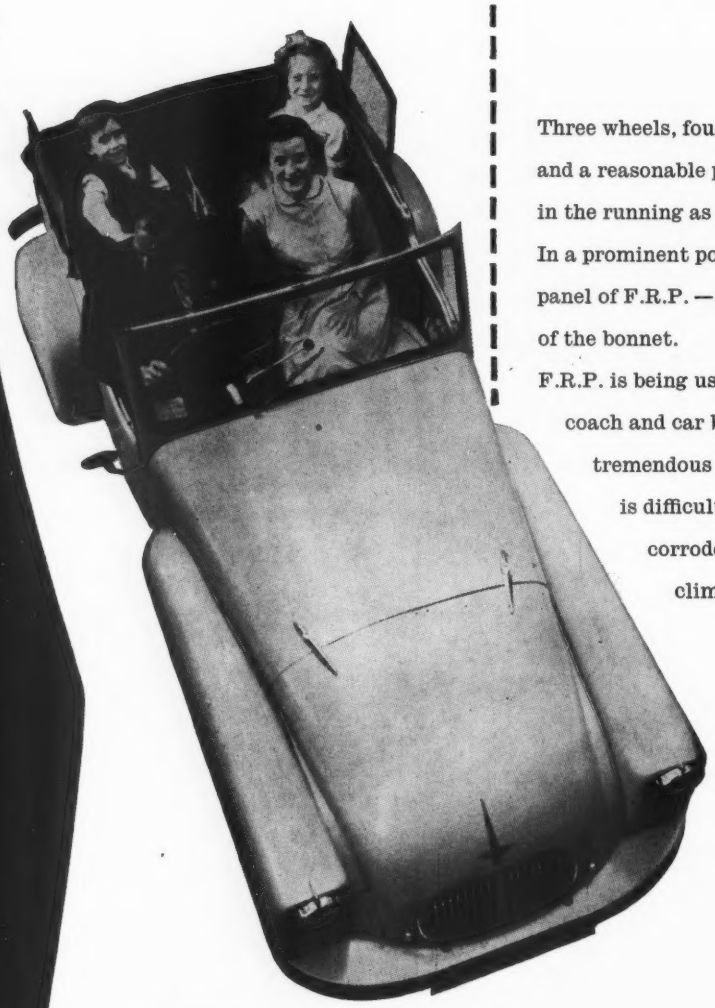

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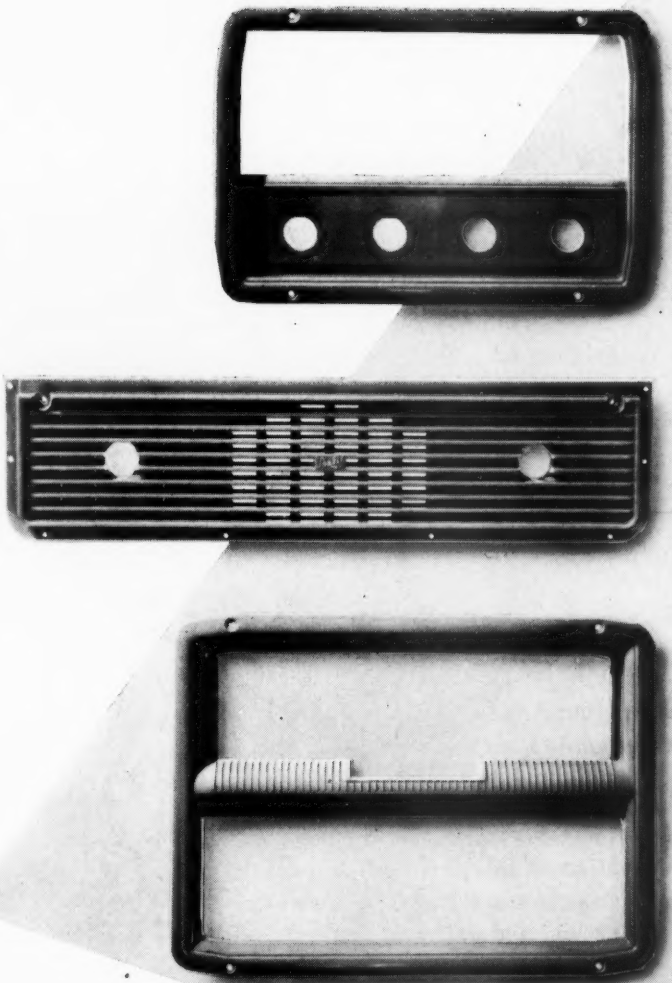

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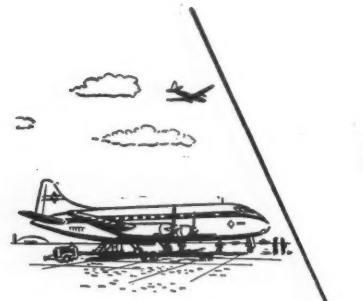

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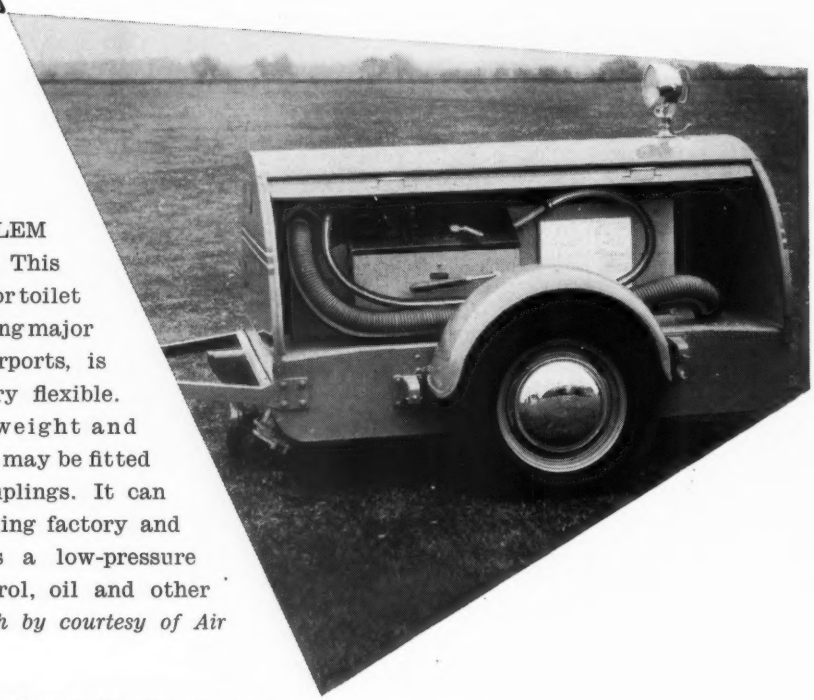

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LATYMER LEADS

IN

VACUUM FORMING MACHINERY

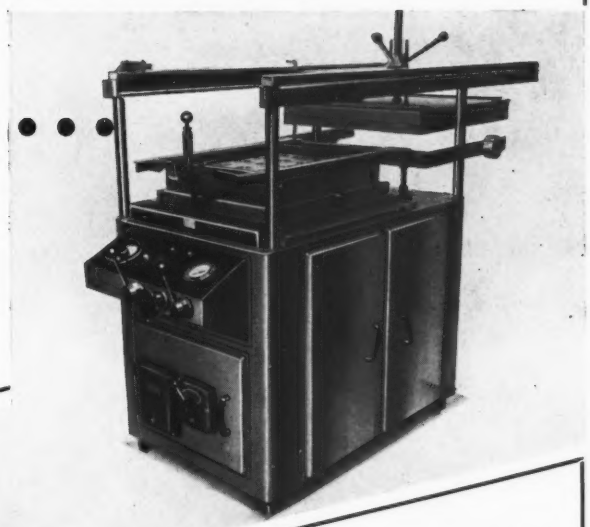
HAND OPERATED

Price Complete

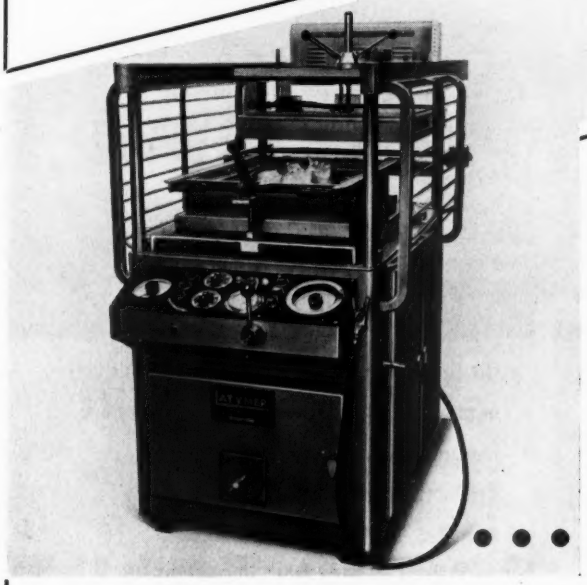
£365

ex works

Robust, well-proportioned, fabricated body. Completely enclosed pump and motor with removable side plates and hinged doors for easy access to interior. Silver stove enamel hammer finish.
Overall dimensions: 6′ 6″ × 2′ 8″ × 5′.
Moulding area: 25″ × 27″ × 12″.
Finger-tip control of accurately balanced clamping frame.
Ribbed cast aluminium platen accommodates any size of mould up to maximum capacity.
Infra-red blanket-type heater easily adjustable for height by single capstan-type handle.
Control panel carries on/off switch, stop/start push button, pilot lamps for heater and motor circuits and chromium-plated vacuum gauge. Seconds timer at eye level.



Photographs by courtesy of "Plastics"



Bodywork and finish as for manual model.
Overall dimensions: 6′ 6″ × 3′ × 5′.
Moulding area: 25″ × 27″ × 12″.
600 dry cycles per hour.
Entirely automatic after sheet clamping.
All controls duplicated for hand operation to facilitate speedy machine setting and experimental work.
Specially hinged guards provide complete protection yet give easy access to work.
Infra-red blanket-type heater.
Single centre-screw adjustment for heater height.
Time cycle on heater circuit variable up to 100 secs.
Variable rate and duration of draw.
Fitted air line for Mould and Material cooling.
Automatic air ejection of finished article.

FULLY AUTOMATIC

Price Complete

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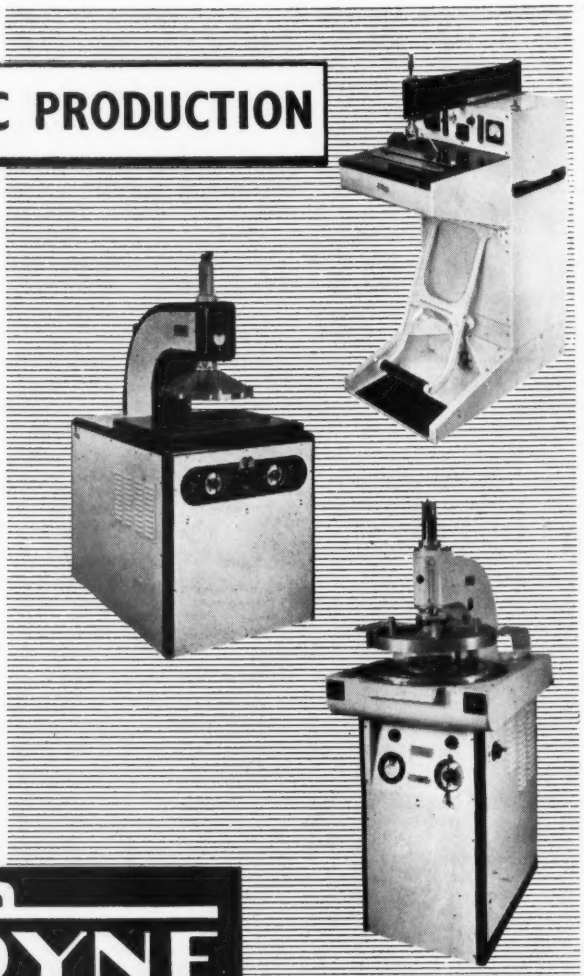

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radio heaters ltd

WOKINGHAM BERKS ENGLAND

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WHEN a famous London caterer decided to find something more suitable than china cups for his milk-bars—because of high breakage rate and unhygienic chipping—he naturally turned to the plastics industry.

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Not only in milk-bars — *wherever* they are used, plastics based on Melamine resins are the best available today.

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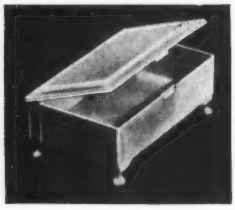

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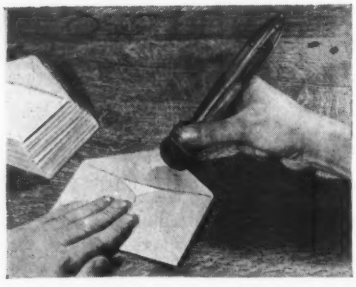

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which applies water or adhesive under finger-tip control from its hollow handle container.

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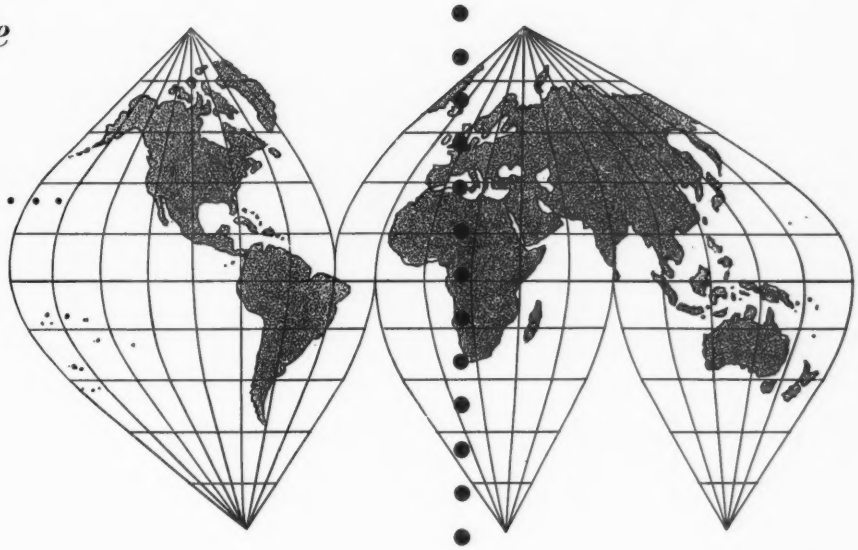

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at Sunday night service may well soften the Managing Director's steely heart and make even the toughest buyer bite his lip, but on Monday morning ten o'clock in the office things are back to normal and hard facts count more than soft answers — and neither of 'em turneth away wrath! Fortunately our products sell on their merits — in itself a pretty fair recommendation. The greater part of our extruding and compression moulding output is taken up by the Electrical and Engineering industries — and we are proud to say that although Plastics are a fairly recent development for us, we have quickly gained a reputation for an excellent job at the right price. Our machines and presses are just about the most modern in the country — we can get to work immediately on receipt of your drawings and make the tools as well. So if you're in the market for switchgear panels, telephone and radio components and cases, control knobs, handles and so on, in any colour and in any quantity —do get in touch with us. We may be able to save you money.

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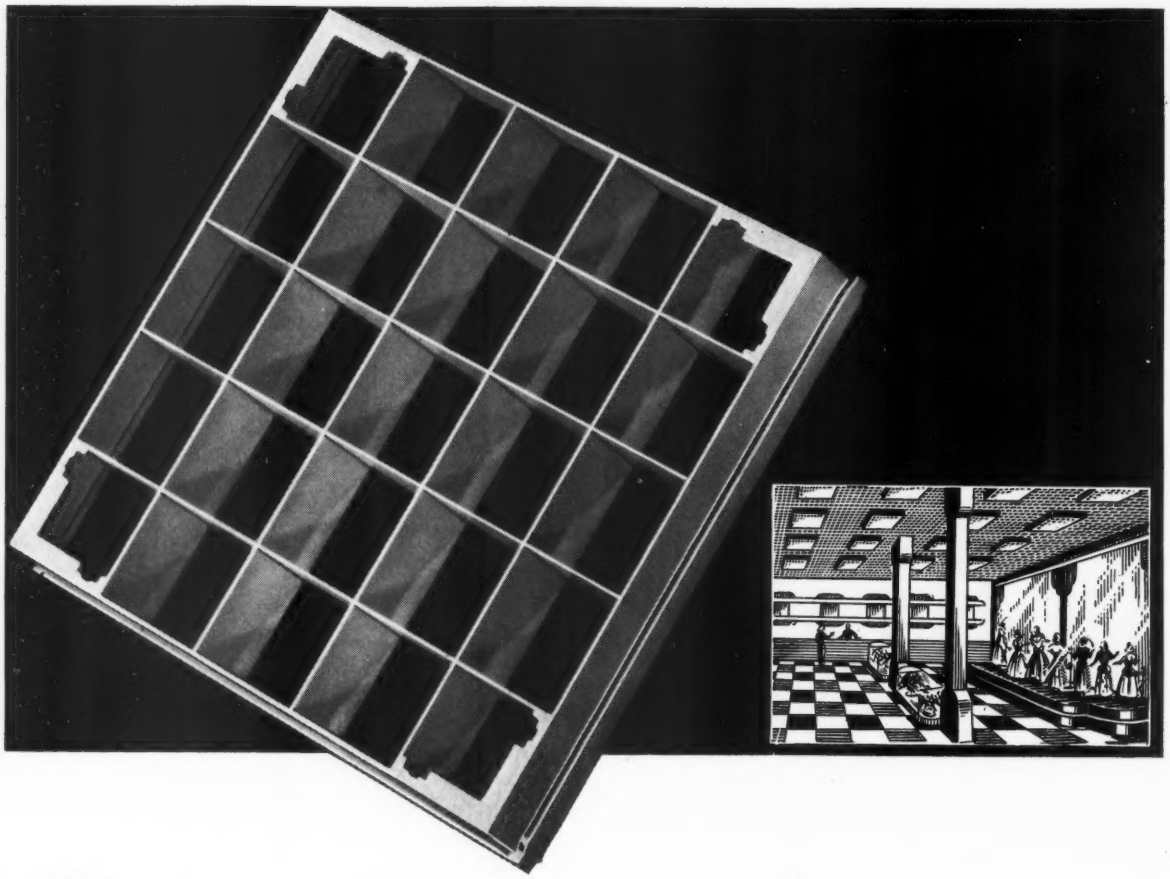

Making light work
OF A LIGHTING PROBLEM

The design of Office, Showroom and Shop Lighting has developed considerably in recent years, and there is no doubt that the new 'Handslite Luve-Tile' now being marketed by Harris & Sheldon Electrical Ltd., is far in advance of its contemporaries. The 16-ounce injection moulding illustrated, shows one of the sections which are mounted together, side by side, to fit into a metal frame let into the ceiling. Extreme accuracy in moulding was essential and a light resistant polystyrene, which will not discolour in use, was selected. This moulding is yet another excellent example of what can be achieved when a progressive manufacturer joins forces with one of the largest and most experienced independent plastic moulding organisations in the country. Our thirty years' specialised experience in producing accurate mouldings with an unequalled surface finish, by compression or injection, is at your service.

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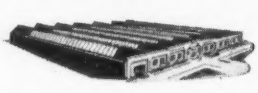
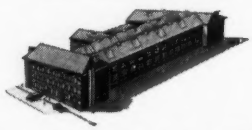
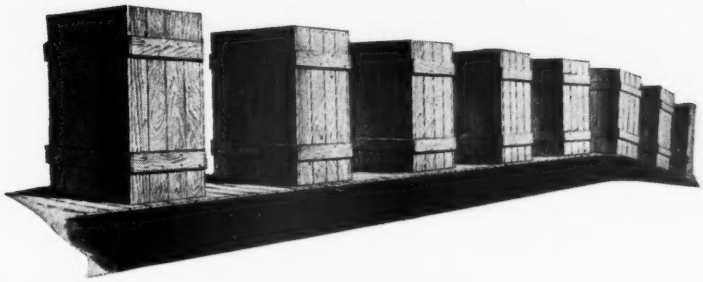


Walsall Works (Eldon Street)



THE PLASTIC MOULDERS WITH THE ENGINEERING BACKGROUND

we were all over the place



until we called in KING *(and got things moving)*

Inefficient, outdated handling methods can play havoc with production figures. They eat up the minutes, the man-hours and the money. More and more production men are becoming aware of the need for modern mechanical handling methods. If you're not happy with your present handling methods, **call in KING and get things moving.** *Our representative will call on you—anywhere in the world.*

***STREAMLINE* YOUR PRODUCTION WITH**

KING REGISTERED TRADE MARK **CONVEYORS • CRANES • PULLEY BLOCKS**

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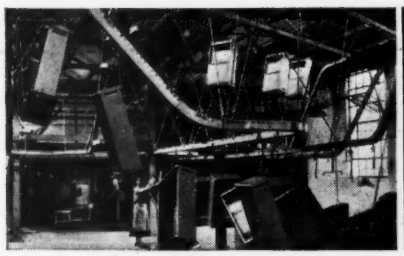
A KING P.C.P. LIGHT-TYPE CONVEYOR *carrying heater bodies at Valor Company's Works. For loads up to 200 lbs.*

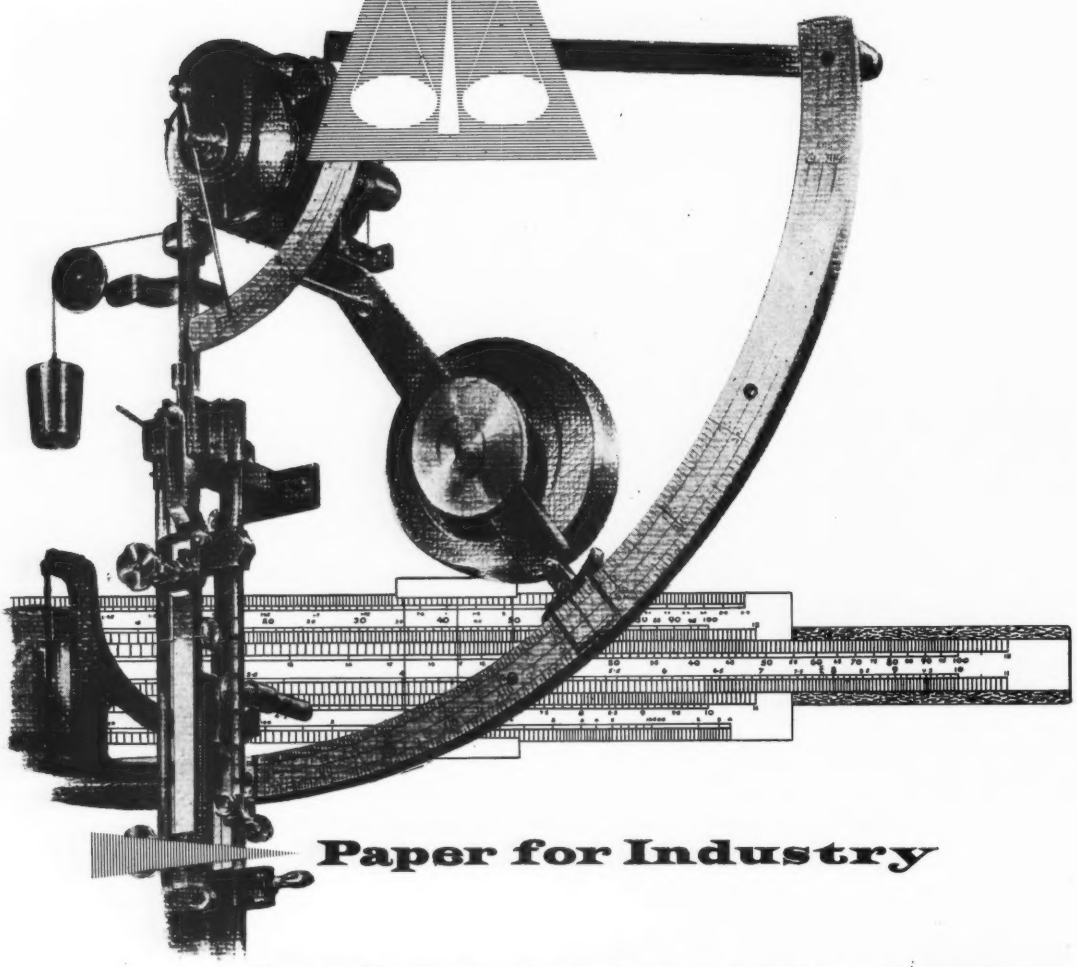


A KING OVERHEAD TRAVELLING CRANE—*cab controlled—working with precision in a foundry.*

A KING POWER-PULLED HEAVY DUTY CONVEYOR *shown working at the Robbialac factory. For loads up to 1 ton.*

WRITE FOR ILLUSTRATED LEAFLETS TO GEO. W. KING LTD., 67 Argyle Works, Stevenage, Herts. Telephone: Stevenage 440

control



Paper for Industry

Papermaking is not yet a precise science, and as a compromise between conflicting requirements in paper has often to be made, it is only by very careful scientific control that the final specification can be met. The Wiggins Teape Group is well equipped with the most up-to-date control methods and in addition has nearly 200 years of papermaking know-how and experience. New industrial uses for paper cover a large part of the Research programme of the Group.

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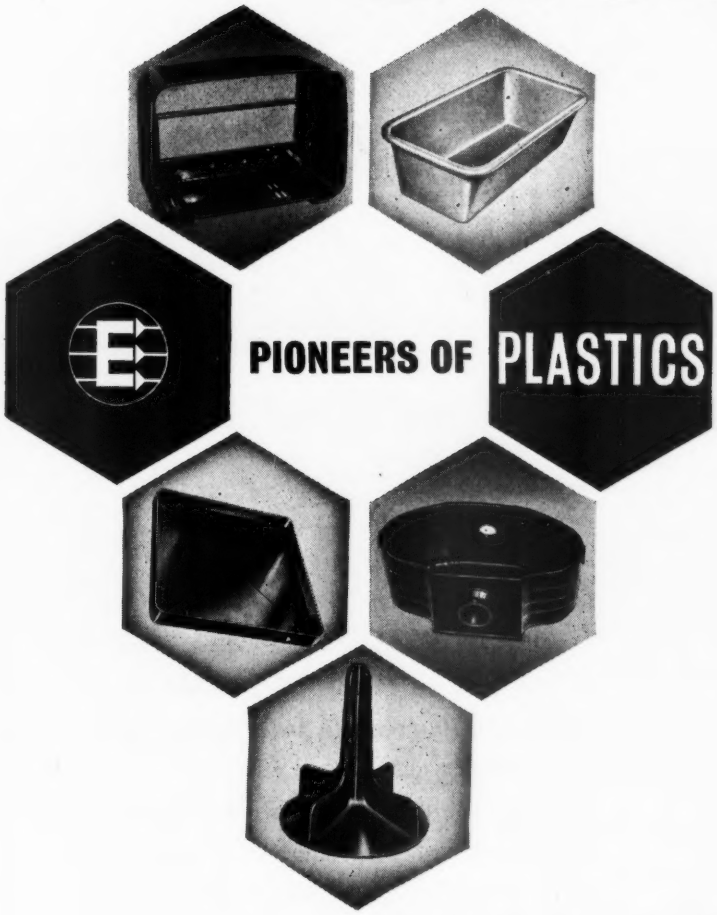


PIONEERS OF PLASTICS IN INDUSTRY

We have pioneered plastics in industry since 1932, when the first large plastic mouldings to be produced in this country left the presses at our Southend plant.

During 1933, we produced 150,000 moulded radio cabinets—no mean achievement at a time when large plastic mouldings were considered as an academic proposition. Since 1936, our increased capacity enabled us to undertake work for leading British industrial organisations, who have continued to entrust their contracts to us.

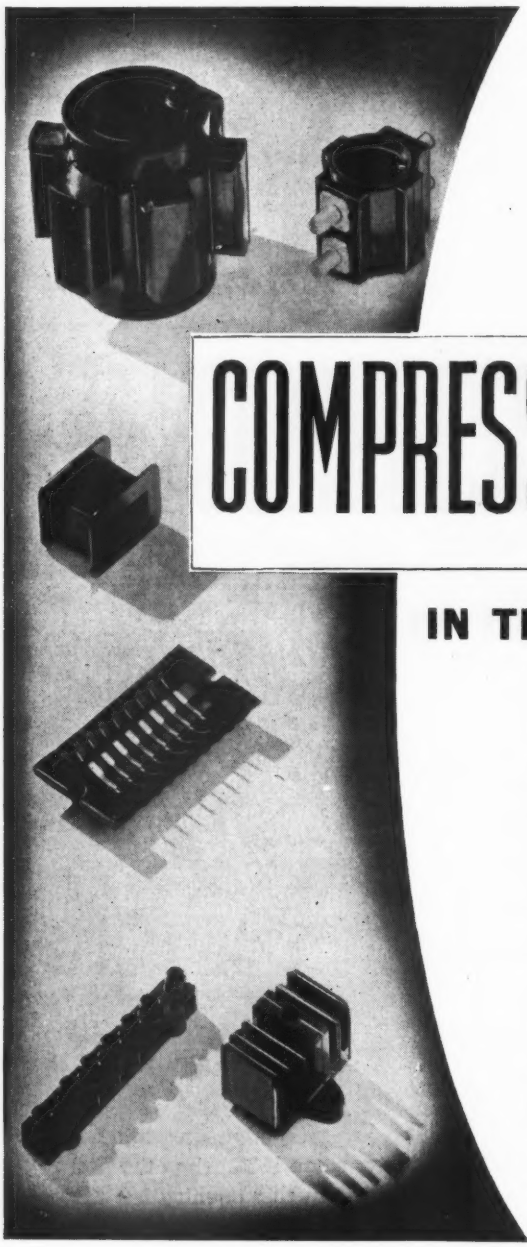
To-day, our Plastics Division uses about 50 tons of moulding materials for the weekly production of over 1,000,000 mouldings.

We have spent large sums on research and development and our technical staff has been responsible for many improvements in moulding processes and materials.

Our considerable experience, up-to-date plant—one of the largest in the United Kingdom—and 'know-how', are at your disposal for the design, tooling and production of every type of plastic moulding for industry.

See us on Stand No. 30 at the British Plastics Exhibition.

E. K. COLE LIMITED (PLASTICS DIVISION)



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A highly qualified technical staff is at your service.

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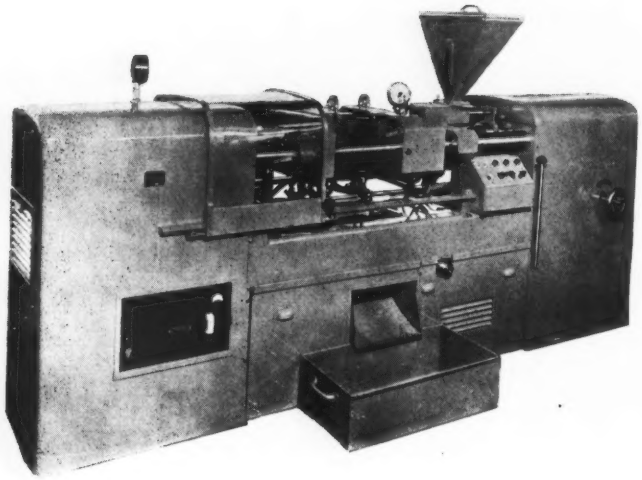

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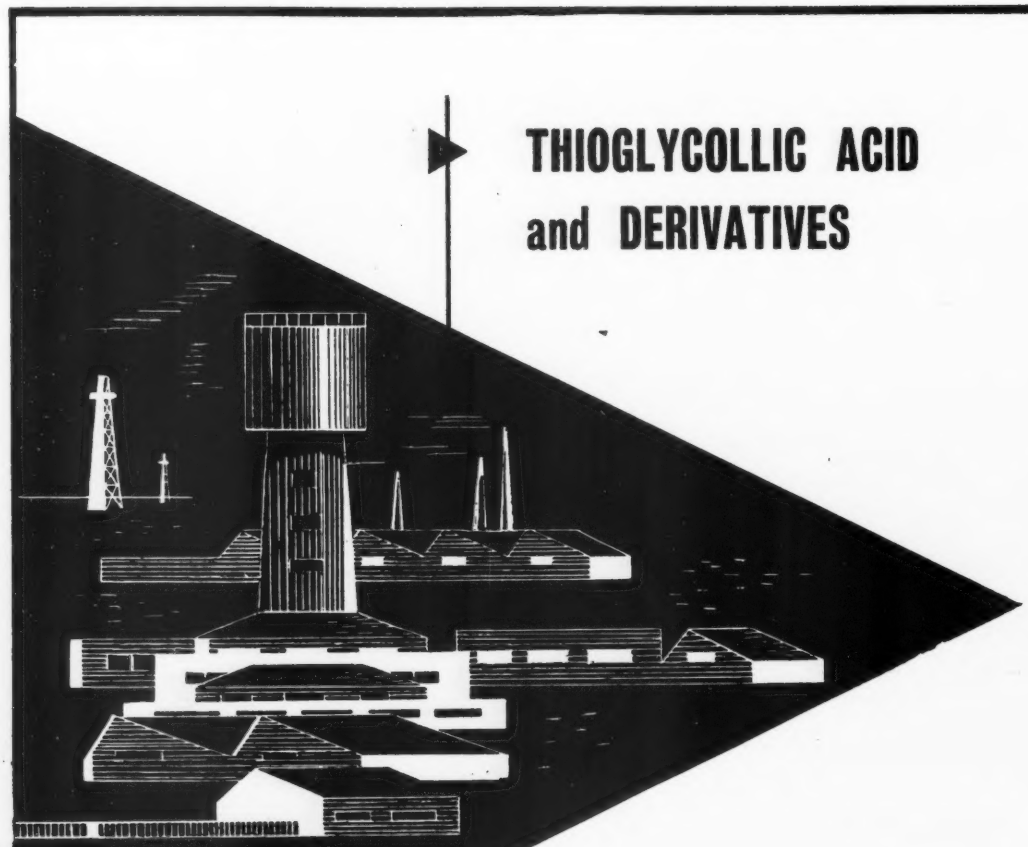

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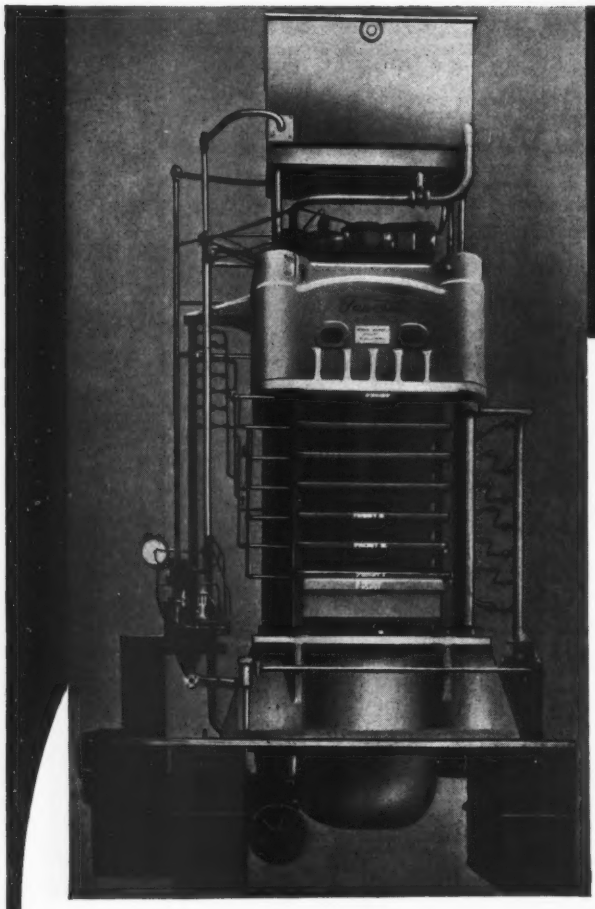

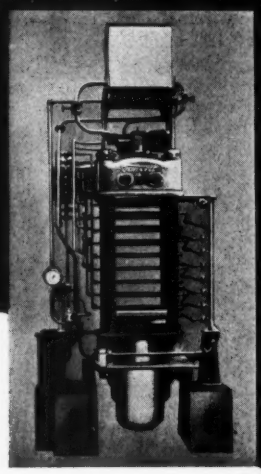

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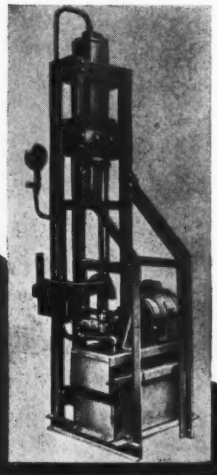

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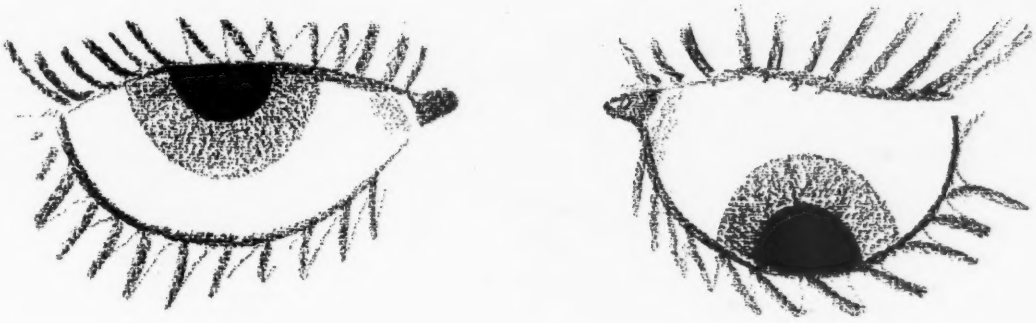

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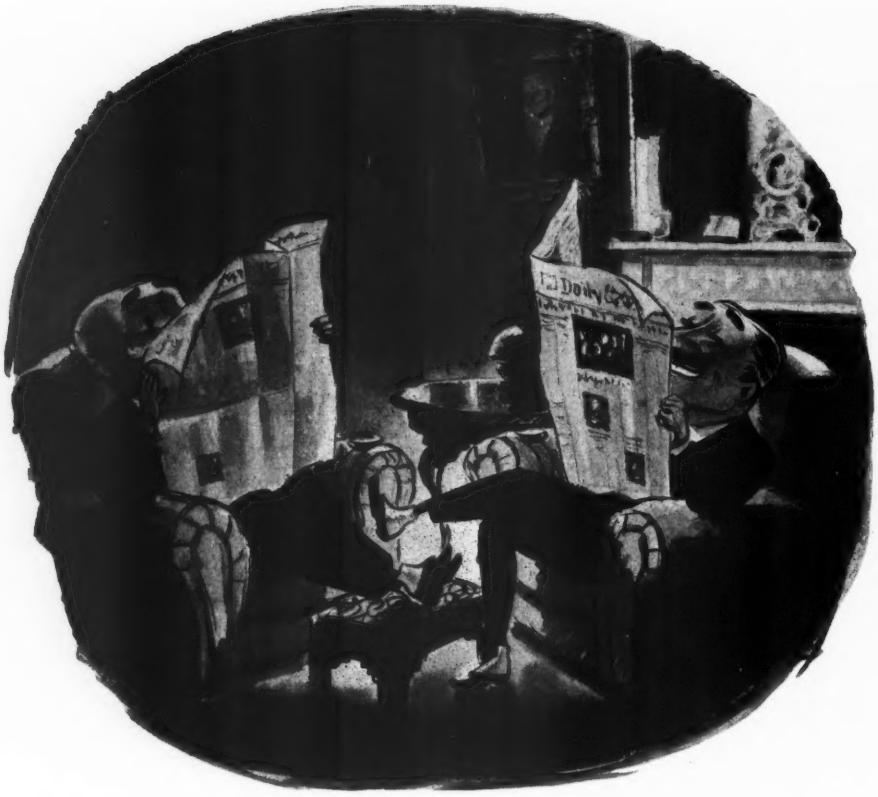

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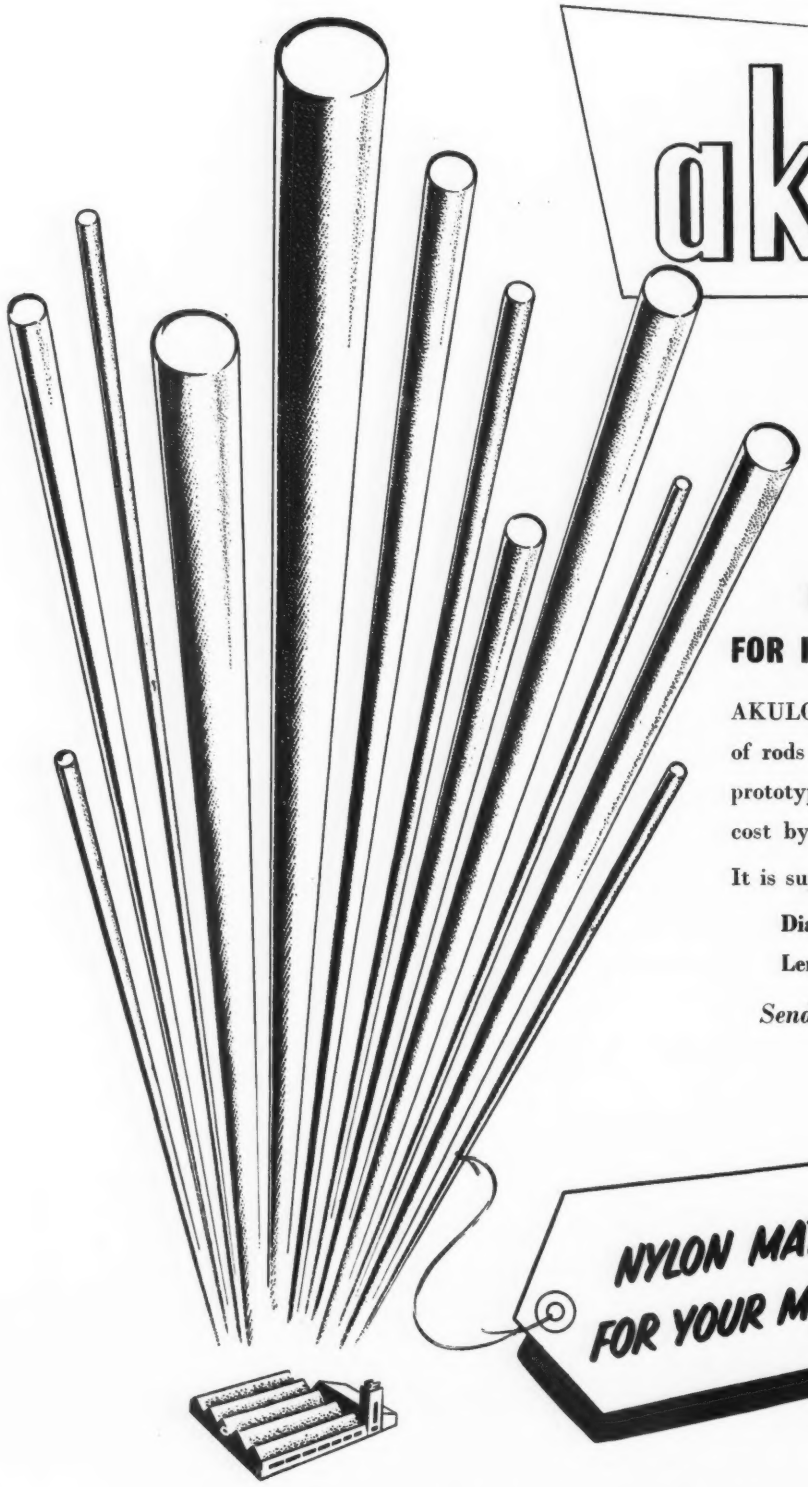

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I bet you did'nt know that Hypreth could give a finith ath fine ath 1 micro inch ; I'm pretty thmooth mythelf but they thaid that thith rattle wath made in a mould that wath thmoother than me !—it wath Hypreth finithed—and you mutht admit it'th a thuper finith."

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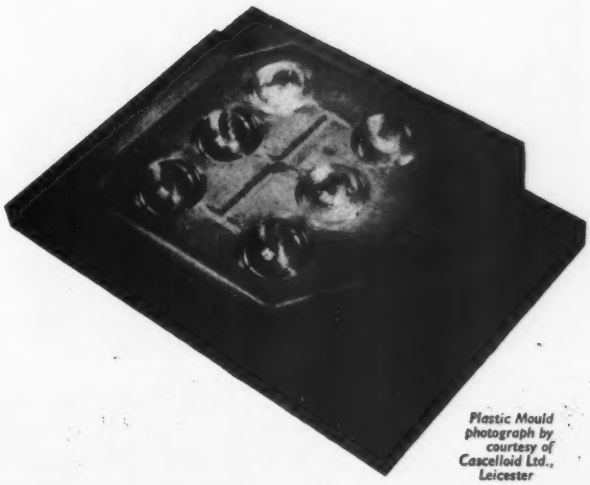

Plastic Mould photograph by courtesy of Cascelloid Ltd., Leicester

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but . . .
tradition must bow to progress and by progress we mean . .

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1st - 11th JUNE, 1955

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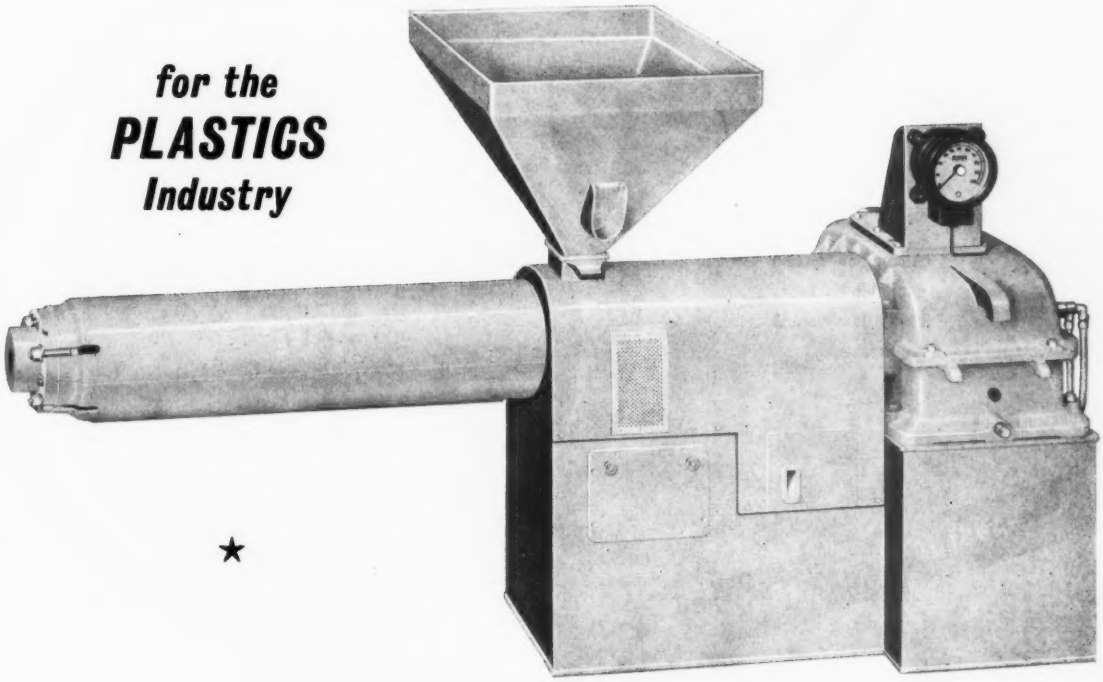
for the **PLASTICS** *Industry*



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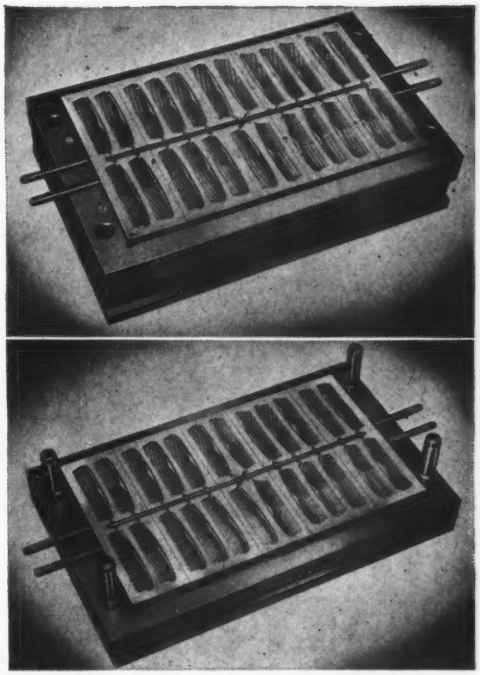
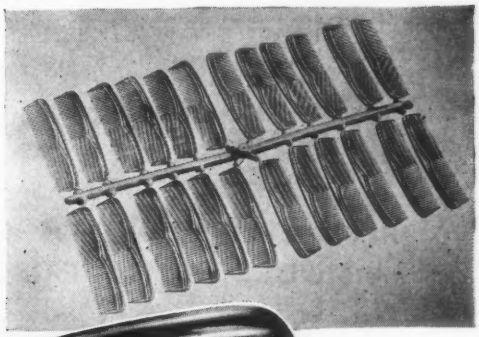
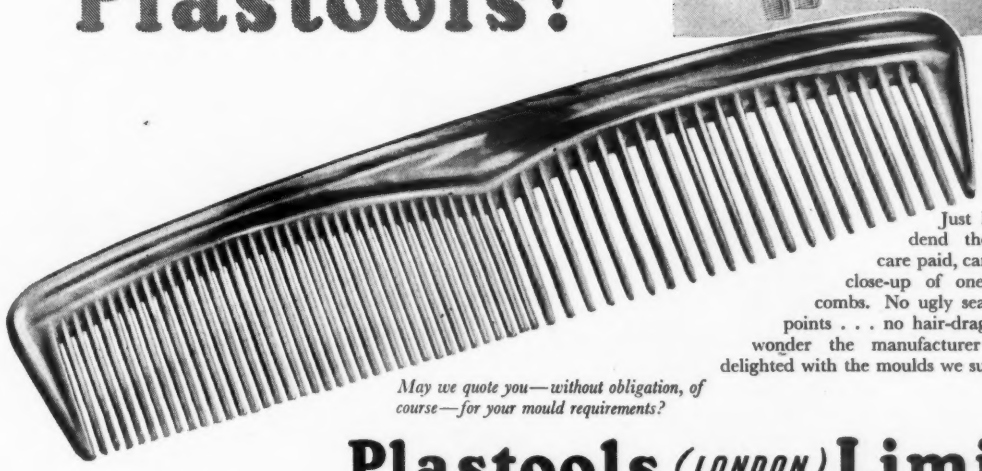


Here are the male and female parts of a mould we made recently for a plastic comb manufacturer. Even for an ordinary "run-of-the-mill" product like that, our moulds were exactingly fashioned down to the very last detail.

use moulds by Plastools!





Just how great a dividend the extra Plastools care paid, can be seen from this close-up of one of the finished combs. No ugly seams . . . no weak points . . . no hair-dragging snags: small wonder the manufacturer was so wholly delighted with the moulds we supplied.

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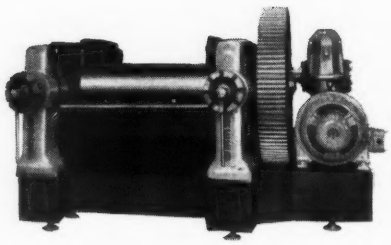

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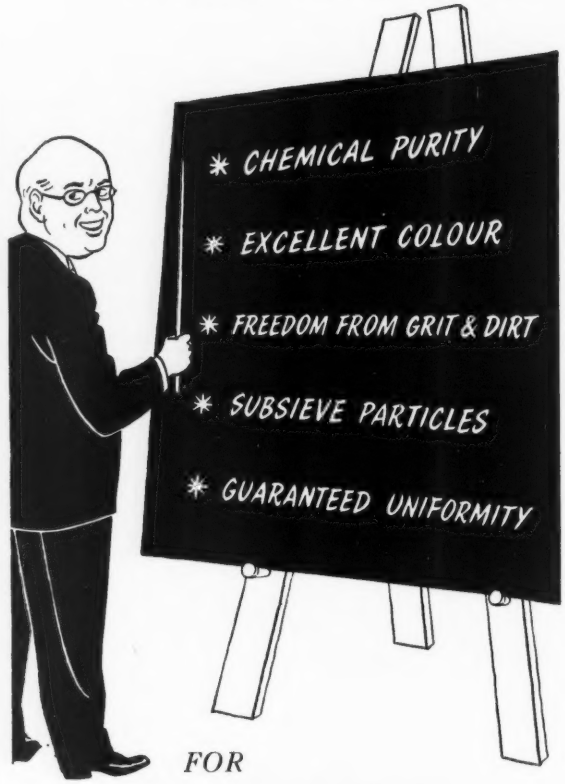

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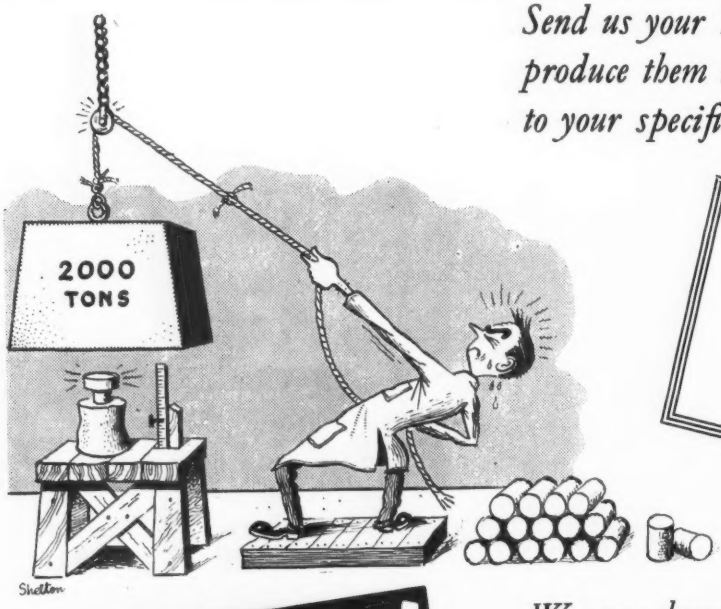

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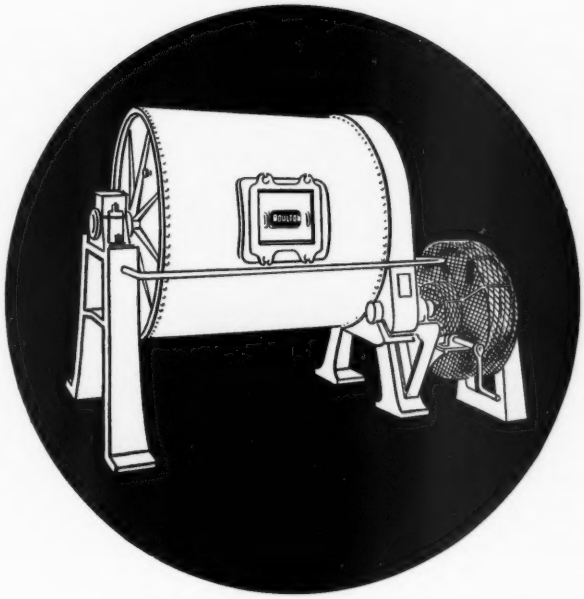

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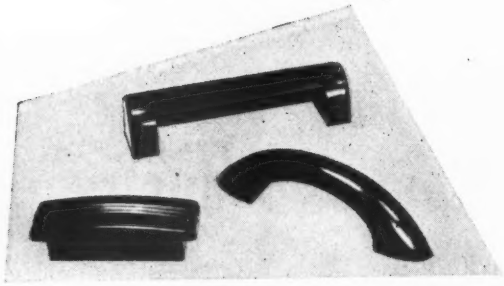

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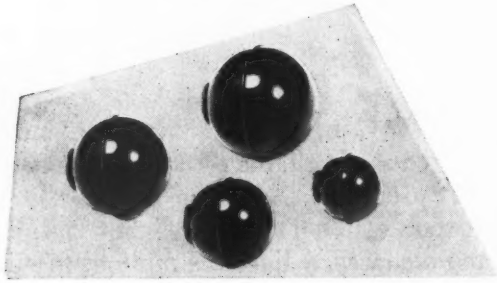

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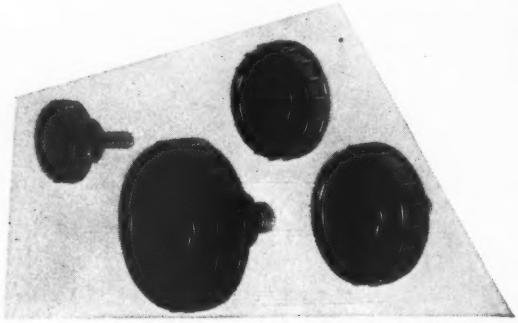

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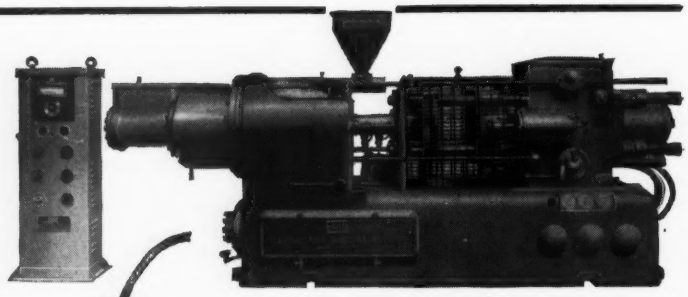

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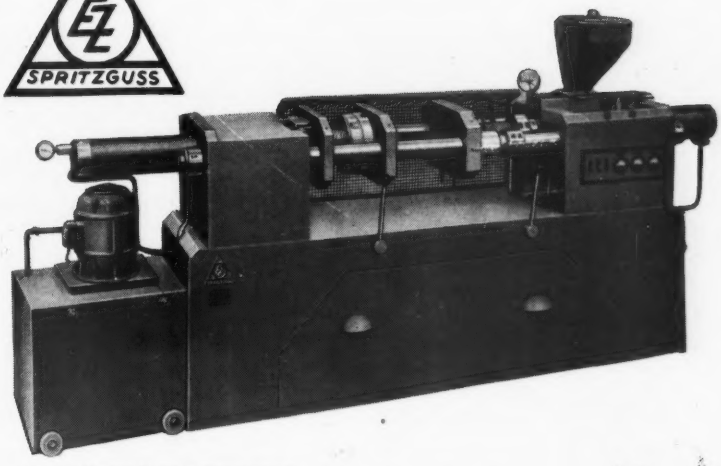

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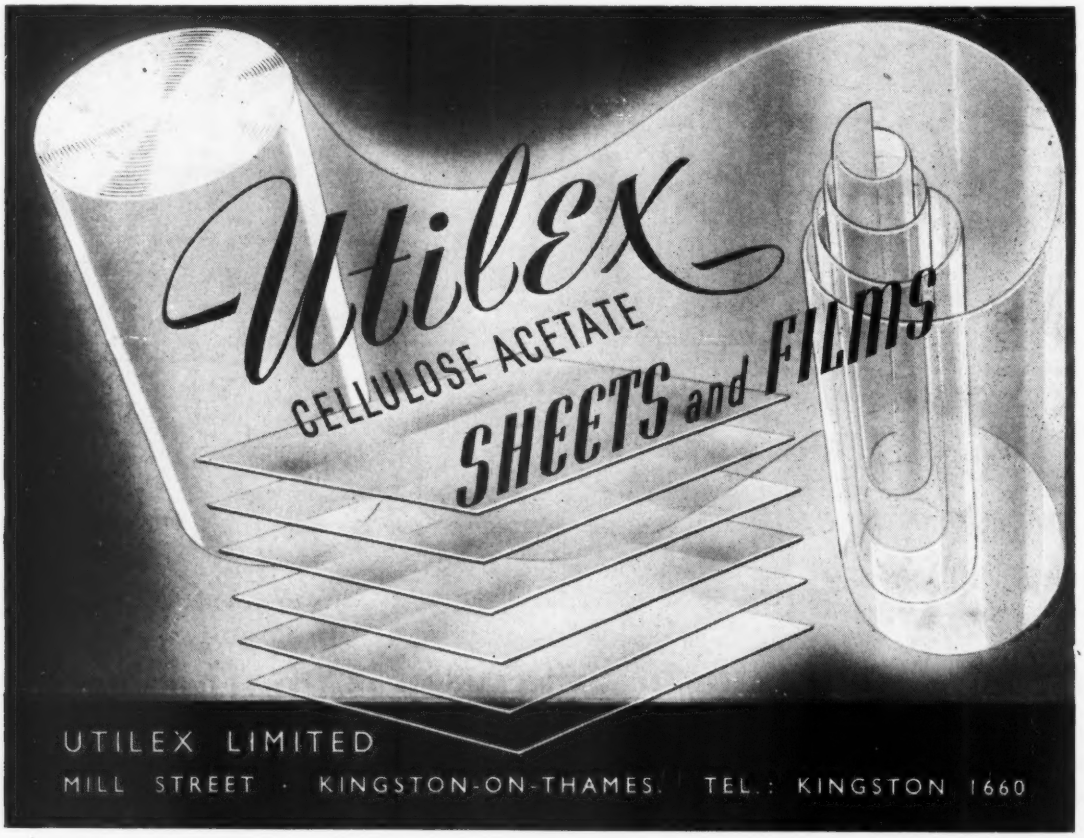

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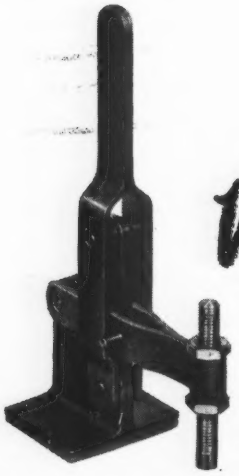

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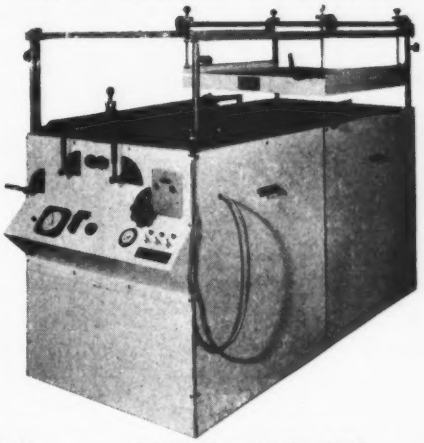

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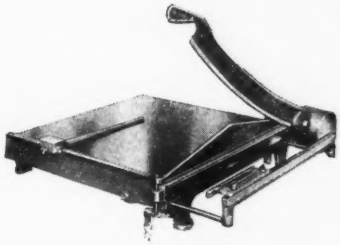

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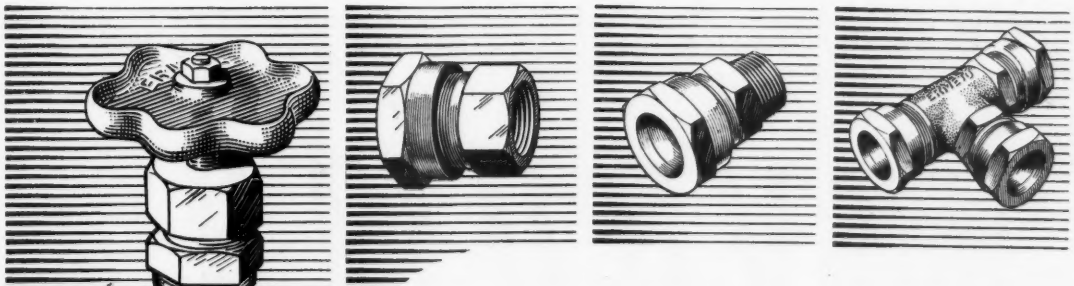

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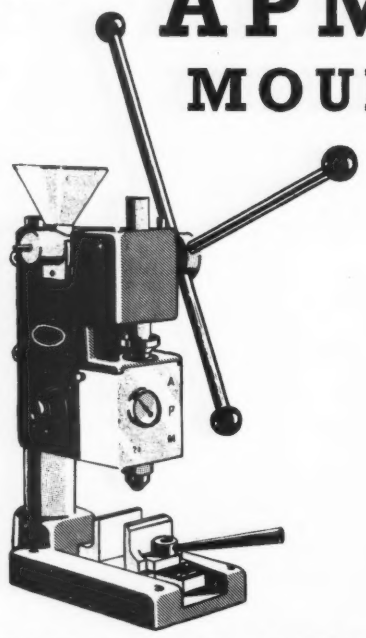

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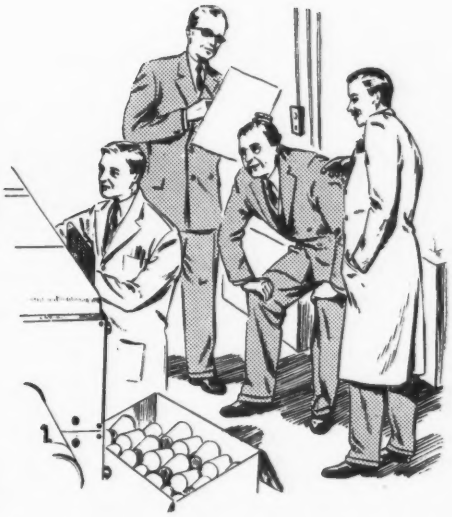

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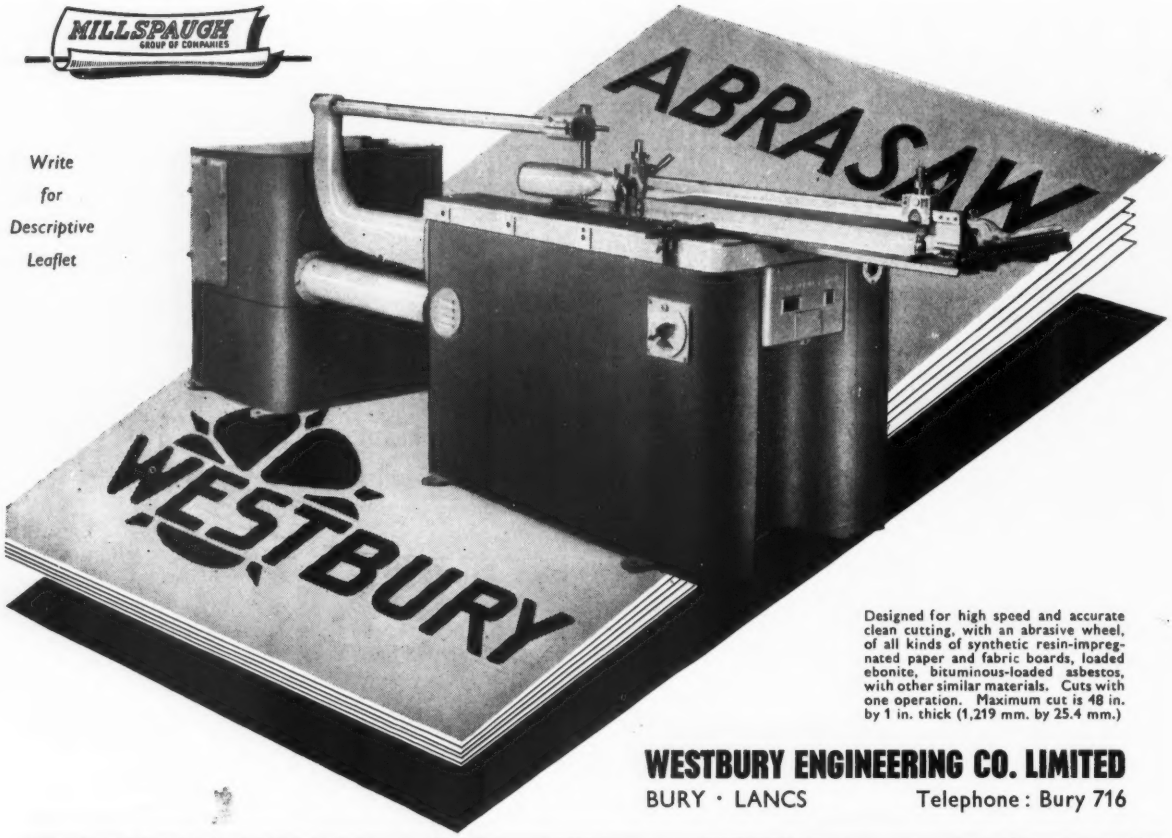

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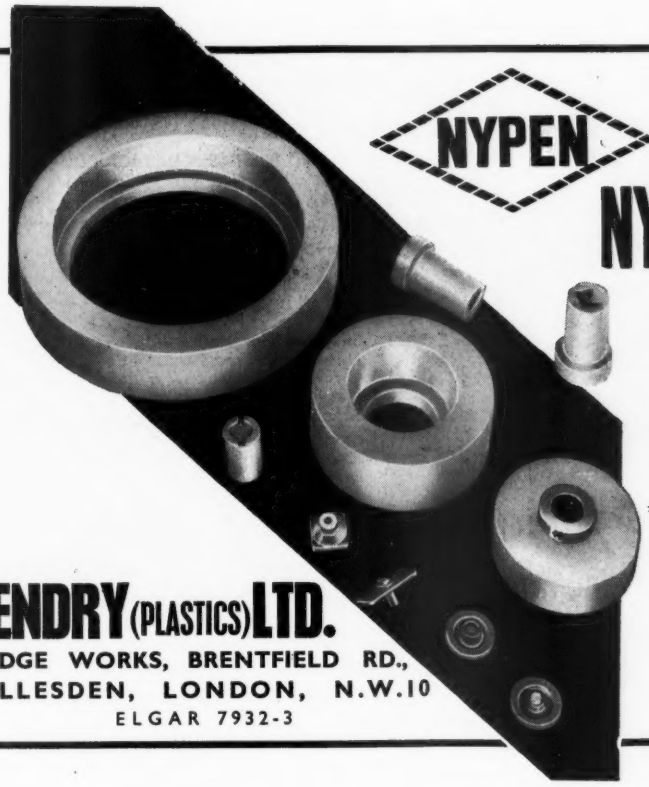

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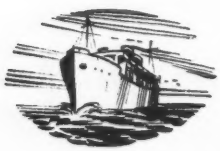

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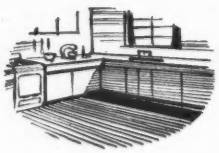

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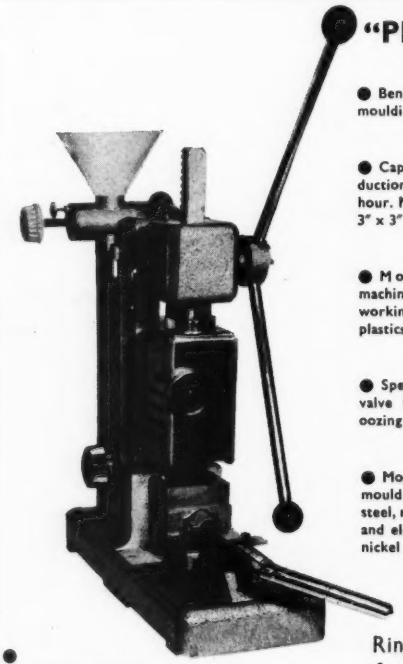

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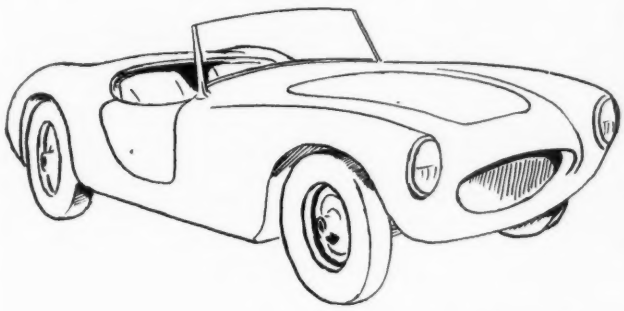

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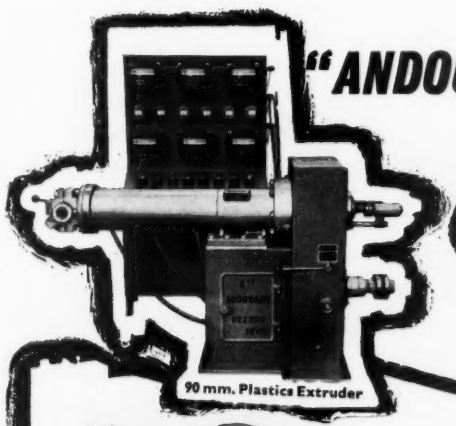
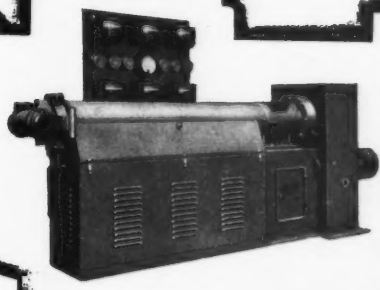


90 mm. Plastics Extruder



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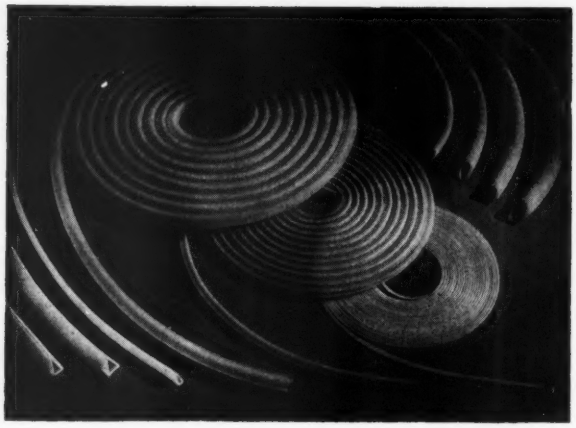

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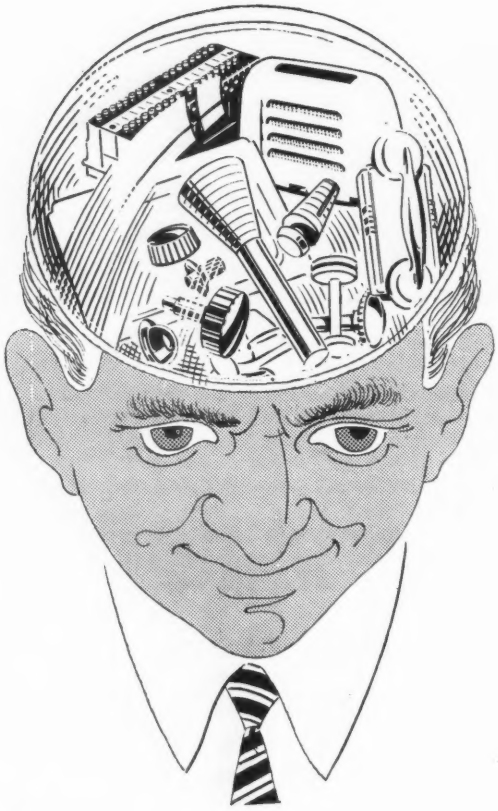

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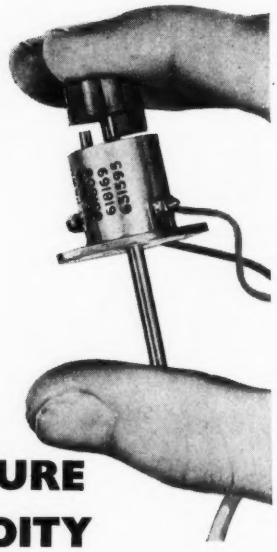

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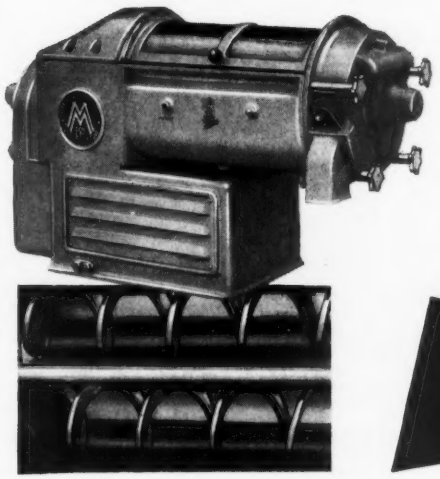

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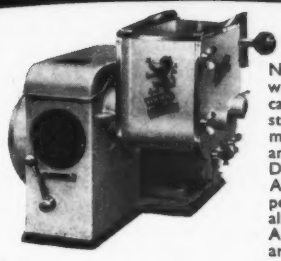

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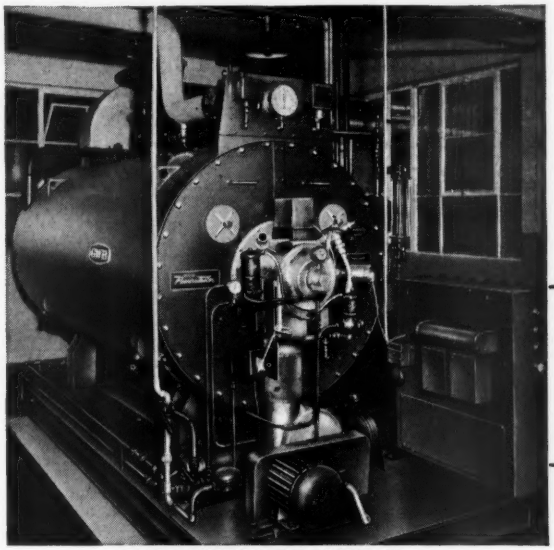

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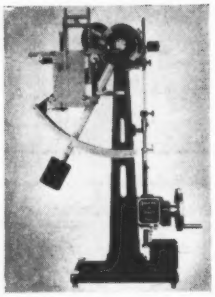

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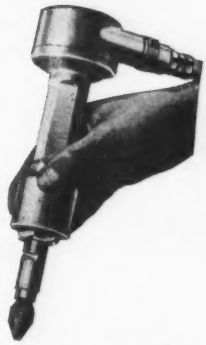

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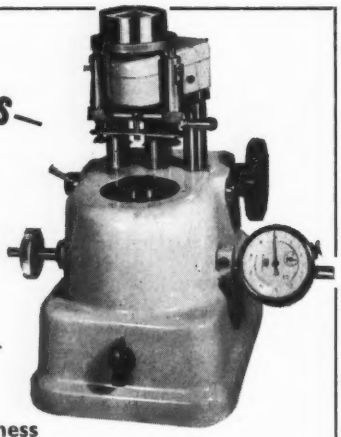

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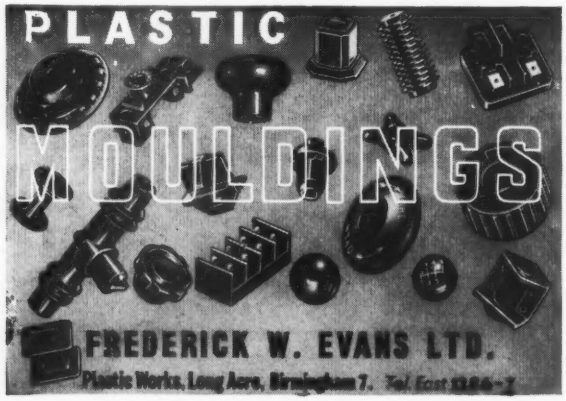
Telephone : Guildford 66920



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GROUND FLOOR
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OF 15,000 TO 25,000 SQUARE FEET
FOR MOTOR ACCESSORY ENGINEERS
— WOULD RENT OR PURCHASE —

CHAMBERLAIN & WILLOWS
23, MOORGATE LONDON, E.C.2
METropolitan 8001/8

Classified Advertisements

PRESS DAY.—Classified advertisements for the July issue must be received at Head Office by first post Tuesday, June 28th.
Last-minute additions and deletions are accepted by telephone from trade advertisers up to noon. Advertisements received too late for a particular issue are automatically inserted in the succeeding one unless instructions to the contrary are received.

RATES.—4d. per word (minimum 12 words 4/-). Each paragraph charged separately and name and address must be paid for. Semi-displayed setting 35/- per single column inch. Series discounts of 5% for 6, and 10% for 12 consecutive insertions allowed to trade advertisers.

TERMS.—Strictly net and prepayable. Monthly accounts for settlement by the end of the month following insertion are allowed to trade advertisers if satisfactory references are provided.

REMITTANCES.—Cheques and postal orders should be crossed and made payable to TEMPLE PRESS LIMITED and instructions sent addressed to the Manager, "Plastics," Bowling Green Lane, London, E.C.1.

THE PROPRIETORS retain the right to refuse or withdraw advertisements at their discretion and are not responsible for clerical or printers' errors although every care is taken to avoid mistakes.

BOX NUMBERS.—Private advertisers desiring to have replies sent care of "Plastics" may do so on payment of 1/- to cover booking and postage, plus cost of four extra words. To avoid mistakes in forwarding, Box Numbers should be carefully and legibly copied and replies sent to Box P000, care of "Plastics," Bowling Green Lane, London, E.C.1.

DEPOSIT SYSTEM facilities are available to readers to purchase advertised goods through "Plastics." Commission 1% (minimum 2/-) on amount deposited.

HEAD OFFICES: Bowling Green Lane, London, E.C.1, England. Telephone: Terminus 3636. Telegrams: "Pressimus, Phone, London."

BRANCH OFFICES: 7, John Bright Street, Birmingham, 1. Telephone: Midland 4117-8. 50, Hertford Street, Coventry. Telephone: Coventry 62464. 1, Brazennose Street, Manchester. Telephone: Blackfriars 5038-9. 12, Renfield Street, Glasgow. Telephone: Glasgow Central 1413.

AUCTIONS

ESTABLISHED 1855.

EDWARD RUSHTON, SON AND KENYON,

INDUSTRIAL VALUERS, AUCTIONEERS AND

FIRE LOSS ASSESSORS,

12 YORK STREET,

MANCHESTER, 2.

Phone, Central 1937-8.

Grams, Russonken, Manchester. zzz-486

BUSINESSES, PREMISES, OFFICES, ETC.

COMPRESSION MOULDING BUSINESS for sale, fully equipped, including toolroom and a large range of moulds, for proprietary lines. Near London, and factory is 10,000 sq. ft. super, half single and half two storey. The freehold is available. Would consider sale of plant and/or moulds in separate lots. Health reasons for disposal. This is a rare opportunity for an organization wishing to add a plastics division to their business, or a firm of distributors, seeking their own manufacturing facilities. A reasonable price is required. Only companies or principals directly interested, with necessary references, write Box P143, care of "Plastics." 216-1134

FITTED FOR PLASTIC MOULDS AND TOOL-MAKING, established 1934, convenient 2-storey factory about 2,000 sq. ft., situated North London, freehold £10,000, including plant, machinery, tools, stock and goodwill. Particulars Chamberlain and Willows, 9-13 Pentonville Rd., N.1. Ter 2241. 215-14

BUSINESSES, PREMISES, OFFICES, ETC.—WANTED

PUBLIC COMPANY wanted, plastic or allied trade, with quoted shares. Write full particulars in confidence to Box P155, care of "Plastics." 215-2

BUSINESS OPPORTUNITIES

PROGRESSIVE COMPANY marketing plastic goods; offers services to manufacturers as sole distributors. All offers to Acro Marketing, Ltd., 9 Warwick Court, W.C.1. 216-12

EXTRUSIONS BY MARLEY.

BUYERS REQUIRING

RIGID AND FLEXIBLE TUBES

AND SECTIONS

IN THERMOPLASTIC MATERIALS

SHOULD ASK FOR A QUOTATION

FROM

MARLEY EXTRUSIONS, LTD.,

119 LONDON ROAD,

RIVERHEAD,

SEVENOAKS, KENT.

Sevenoaks 2251. 215-32

Business Opportunities (contd.)

VACUUM-FORMING CAPACITY available together with full facilities for fabricating engraving and printing of all plastic materials. Omega Plastics, Ltd., Highbridge Rd., Town Quay, Barking, Essex. 216-13

FINANCIAL AND PARTNERSHIP

INVESTOR IS PREPARED to consider financing manufacture of industrial components from newer plastic materials. Any person interested should have experience, technical qualifications and the ability to organize such a venture. Replies treated in strict confidence to Box P146, care of "Plastics." 215-1135

PLASTICS COMPANY with substantial tax losses required. Write in confidence with details in first instance to Landau, Morley and Scott, 52-54 High Holborn, London, W.C.1. 216-1142

MACHINERY, TOOLS AND PLANT

HYDRAULIC PRESSES

Six 1,160-ton upstroke presses by Robertson and Orcher, glanded ram 33¼-in. diameter by 15-in. stroke, four columns 8-in. diameter, distance between, 7 ft. 1 in. by 17 in., semi-guided moving table and head with working area 6 ft. 5 in. by 4 ft., daylight 13¼ in., W.P. 3,000 p.s.i., fitted 2 C.I. platens, 5 ft. 5 in. by 4 ft. by 4½ in.

Seven 400-ton downstroke presses by Greenwood and Batley, ram 16-in. diameter by 30-in. stroke, W.P. 2 tons sq. in., four columns 5½-in. diameter, distance between 22 in. by 17⅝ in., fully guided moving table, working area 31¾ in. by 22 in., daylight 54 in.

350-ton self-contained downstroke press by John Shaw, main ram 21-in. diameter by 29-in. stroke, W.P. 1 ton sq. in., four columns 5½-in. diameter, distance between 36⅜ in. by 18⅜ in., fully guided moving table, working area 36 in. square, pair electric platens, 36 in. square, daylight 33 in., Hele Shaw pump, motorized 400/3/50.

285-ton upstroke Multi-daylight platen press by Iddon, ram 19-in. diameter by 15-in. stroke, four columns, 4½-in. diameter, distances between 31½ in. and 13½ in., to head and table are fitted steam-heated platens 30 in. square by 2 in. thick with intermediate platens giving four daylights of approximately 4⅝ in., platen W.P. 100 p.s.i., press W.P. 1 ton sq. in.

250-ton upstroke press, ram 18-in. diameter by 15-in. stroke, W.P. 1 ton sq. in., four columns 5⅝-in. diameter, distance between 22½ in. by 18 in., semi-guided tee-slotted table, 30 in. by 14 in. by 9½ in. deep, daylight 14½ in.

200-ton downstroke compression or transfer-moulding press by Hydraulic Eng., main piston-type ram effective diameter 11 in. by 9¾ in. diameter rod by 12-in. stroke, fixed and moving tables each with working area 30 in. by 21 in., maximum daylight 30 in., W.P. 2 tons sq. in.

160-ton downstroke press by E.M.B., ram 12-in. diameter by 13-in. stroke, tee-slotted moving tables 26 in. by 19 in., daylight 16 in., ejector or transfer ram 5½ in. diameter by 6½ in. stroke, main pressing power 160 tons, mould breaking power 14 tons, ejector power 35 tons, W.P. 1½ tons sq. in., Towler Electraulic pump.

GEORGE COHEN, SONS AND CO., LTD.,

WOOD LANE, LONDON, W.12.

Phone, Shepherd's Bush 2070.

AND

STANNINGLEY, NR. LEEDS.

Phone, Pudsey 2241. 215-24

HYDRAULIC. Frazer Mono-radial pumps, new and second-hand in stock. Thompson and Son (Millwall), Ltd., Cuba St., London, E.14. East 1844. zzz-483

Machinery, Tools and Plant (contd.)

ALTERATIONS. Diesel sets, electric motors, switch gear, transmission equipment, fluorescent lighting and industrial fittings ex stock, keen prices. Contact G. L. Murphy, Ltd., Manston, near Leeds. zzz-489

STOCK DELIVERY. Four-cylinder hydraulic pumps, 4 g.p.m., 1 ton pressure, £30 or motorized 3-phase, £70. John Steel, Castlefields, Bingley. zzz-495

PLASTICS MACHINERY.

Hydraulic Presses of all sizes. Injection Machines. Extruders. Mixing Mills. Hydraulic Pumps and Accumulators.

Send your requirements to the specialists.

REED BROTHERS (ENGINEERING), LTD.,

REPLANT WORKS,

CUBA STREET, MILLWALL, E.14.

Phone, East 4081 (five lines). 215-18

SEEING IS BELIEVING!!! Make a point to see our new powerful motorized dust, fume extractor-blower units at new low price (£23). Everyone doing so, is most impressed. Bellangers, 306 Holloway Rd., London, N.7. North 4117. 216-1119

WESTMINSTER hand-operated injection moulding machines for 10-gr. shots, in first-class condition, for sale. Box P158, care of "Plastics." 215-8

MACHINERY, TOOLS AND PLANT WANTED

COMPRESSION AND INJECTION-MOULDING TOOLS WANTED. Send details of your surplus, obsolete and redundant moulding tools. Box P1311, care of "Plastics." 218-1129

INJECTION MOULDING MACHINES required. Condition or size not important. Send details. Box P0814, care of "Plastics." 219-1138

MISCELLANEOUS

EXTEND YOUR TRADE.
Use a trade mark. Consult
Trade Mark Protection Society,
12 Church St., Liverpool. zzz-294

MOULDS

DOLL MOULDS FOR HIRE.
10-in., 12-in., 18-in., 25-in. baby and girl dolls with sleeping eyes. Injection moulders and dolls manufacturers please write to: Holloway Dolls (London), Ltd., 27 Church Crescent, London, N.20. 215-1124

PRODUCTION CAPACITY

POLYSTYRENE AND CELLULOSE ACETATE INJECTION MOULDINGS up to 2 oz. Reliable service. Latest-type machines. Keen co-operation on new lines. W. H. Adamson Plastics, 39 Hedley St., Maidstone. 219-1132

INJECTION MOULDINGS AND PLASTIC COVERING IN ACETATE ALKATHENE, P.V.C., POLYSTYRENE AND DIAKON.

Machined Parts in Brass, Steel and Plastics.

We solicit your inquiries.

F. A. KETCH AND SON, LTD.,

TRENT VALLEY WORKS,

LICHFIELD, STAFFS.

Phone 3591 and 3592. zzz-500

Production Capacity (contd.)

SLITTING AND REWINDING OF PLASTIC SHEETING, film, paper, etc., to any width. Prompt service. Nathaniel Lloyd and Co., Ltd., Burrell St., Works, London, S.E.1. 216-1133

INJECTION MOULDING CAPACITY available up to 4 oz. Keenest quotations, prompt deliveries. Fully automatic plant. Rees Plastics, Ltd., 287 Liverpool Rd., London, N.1. Nor 4310. zzz-501

KINGSTON PLASTICS, LTD., Unity Works, Union St., Kingston-on-Thames. Manufacturers of virgin and second-grade cellulose acetate moulding powders, matched to customer's own requirements for colour and flow. Customer's own waste also reprocessed to specified requirements. Sorting and grinding, incorporating magnetic separation of metallic particles of all thermoplastics undertaken. Phone, Kingston 8405. 219-1139

VISIJAR LABORATORIES, LTD.,
THE LEADING CRAFTSMEN IN
" PERSPEX "
PROTOTYPE AND REPETITION.
OFFICIAL I.C.I. STOCKISTS " PERSPEX "
SHEET, TUBE, ROD.
STOCKISTS AND FABRICATORS OF " FORMICA."
149 LONDON ROAD, CROYDON, SURREY.
Phone, Croydon 8228 (two lines). zzz-492

INJECTION MOULDINGS by I.O.G. Industries, Ltd., 41 Marshgate Lane, Stratford, E.15. Maryland 2804. 220-1094

COMPRESSION MOULDING CAPACITY available up to 150-ton presses, will accept sub-contracts, prompt deliveries at competitive prices. Write Box P151, care of " Plastics." 220-1138

INJECTION MOULDINGS IN THERMO-PLASTICS. Moulding in styrene, acrylics and acetate. Design and toolroom facilities available for mould construction. Inquiries invited. J. and E. Courtenay, Ltd., 138 Stratford Rd., Birmingham, 11. 220-1141

CAPACITY AVAILABLE for manufacture of compression and injection moulds to customers' own designs, modern plant and equipment. Inquiries for same will receive prompt attention. Box P1514, care of " Plastics." 216-1143

PLASTICS (MANCHESTER), LTD.,
BRITAIN'S LEADING STOCKISTS AND
DISTRIBUTORS.
SPECIALISTS IN
FABRICATION, INJECTION MOULDING AND
ENGRAVING.
11 WHITWORTH STREET,
MANCHESTER, 1.
Central 7081-2 and Central 1000. zzz-493

CAPACITY AVAILABLE for injection moulding up to 8 oz., trade inquiries invited. Box P159, care of " Plastics." 215-4

VACUUM MOULDERS invite trade inquiries for vacuum-formed articles, moulded in p.v.c., styrene, cellulose acetate, etc. Maximum mould size 36 in. by 36 in. Write Box P098, care of " Plastics." 217-1112

ELCO PLASTICS, LTD.,
HIGH WYCOMBE,
BUCKS.
A.I.D. APPROVED.
MOULDERS, INJECTION COMPRESSION,
TRANSFER, SIDE RAM.
HIGH WYCOMBE 1921-2. zzz-498

REPETITION in Ebonite, Erinoid, etc. Capstan lathe work. Temple St., Rugby. Phone 4059. 223-1118

DINES PRODUCTS, Whitehall Lane, Grays, Essex, for injection mouldings. 223-1120

SHORT RUNS A SPECIALITY: LONG RUNS A PLEASURE. Low mould cost and overheads. Injection capacity and technical knowledge at your service. Westminster Plastics, Temple Works, 41 Old Church Rd., Chingford, E.4. Silverthorn 7927. 223-1121

Production Capacity (contd.)

TUBE LAMINATION AND ENGINEERING, LTD.,
HIGH WYCOMBE,
BUCKS.
MAKERS OF S.R.B.P. TUBE " LAMTUF."
LIGHT ENGINEERS.
HIGH WYCOMBE 1921-2. zzz-499

CHIPPING OF PLASTICS AND GRINDING, screening, mixing and drying of all raw materials undertaken for the trade. Crack Pulverizing Mills, Ltd., Plantation House, London, E.C.3. Man 4405. zzz-487

RAW MATERIAL

PERSPEX! PERSPEX!! PERSPEX!!! Official stockists for I.C.I. acrylic sheets. Sheets cut to your requirements. Fabrication and mounting specialists to the trade:—
S. C. Errington (Hanwell), Ltd., 132a Uxbridge Rd., Hanwell, London, W.7. Phone, Ealing 5288. zzz-40

ALWAYS LARGE STOCKS OF
CASEIN
RODS, TUBES AND SHEETS,
PERSPEX
SHEETS UP TO 1 IN. THICK.
CELLULOSE ACETATE
CATALIN RODS.
S.R. (PLASTICS), LTD.,
93 ALDERSGATE STREET, E.C.1.
Phone, Monarch 4686. 221-1103

FOR HOME AND EXPORT MARKET. We sell at low prices all plastic scraps, acetate, polystyrene, alkathene, reground powders and reconditioned powders. Apply to Box P009, care of " Plastics." 215-19

CUEX, LTD., can offer all at prices well below current list:—
Polystyrene.
Cellulose acetate.
Polyethylene.
P.V.C.
Polyvinyl butyral.
Perspex and Diakon.
Send now for details.
Cuex, Ltd., 270 Corporation St., Birmingham. Central 5474. 215-23

PLASTICS (MANCHESTER), LIMITED,
BRITAIN'S LEADING STOCKISTS
OF
PERSPEX SHEET, ROD, TUBE.
11 WHITWORTH STREET,
MANCHESTER, 1.
Central 7081-2 and 1000. zzz-494

PHENOLIC MOULDING POWDER, black (general purpose), new, large quantity available. Please inquire Box P1512, care of " Plastics." 215-10

POLYTHENE FILM SCRAP, from time to time for sale. Offers invited. Box P156, care of " Plastics." 215-9

NEW HIGH-SPEED ELECTRIC BANDSAWS for sale. For cutting polythene, p.v.c., rubber, Perspex, cork, leather, cloth, etc., stainless steel or wood table. Three sizes, 24 in., 30 in., 36 in. Maximum height of cut on 36-in. machines 19 in. 400/440/3-phase supply. Illustration and prices from makers. F. J. Edwards, Ltd., 359 Euston Rd., London, N.W.1. Eus 4681. 215-12

QUANTITIES OF RIGID P.V.C. OFF-CUTS for disposal; grey, white, cream. Apply Box P1518. 215-27

BLACK CELLULOSE ACETATE MOULDING POWDER. We can always supply first grade at 2s. per lb., any quantity. Box P008, care of " Plastics." 215-20

RAW MATERIAL WANTED

WANTED, Polythene scrap. Write to Box P7416, care of " Plastics." zzz-0322

SURPLUS STOCKS of thermosetting and thermoplastic moulding powders wanted. Send details Box P056, care of " Plastics." zzz-481

Raw Material Wanted (contd.)

ERLANOS, LTD., 93 Aldersgate St., E.C. (Monarch 4686), require Perspex and cellulose offcuts and scrap, clear and coloured, highest prices paid. 217-1079

P.V.C. GARMENT AND HANDBAG OFFCUTS wanted. We collect and pay cash. Brockwell Plastics, Ltd., 50 Hollingbourne Rd., S.E.24. zzz-490

PROMPT CASH OFFERED for virgin and reprocessed cellulose acetate and polystyrene. Give manufacturer's name and backing. Box P873, care of " Plastics " zzz-491

SCRAP.
WE BUY
ALL THERMO-PLASTICS. REJECTED MOULDED PIECES. OBSOLETE MOULDING POWDERS, LUMPS, SPRUES AND RUNNERS.
AND PAY HIGHEST PRICES.
J. W. NASH AND CO., LTD.,
27 BEETHOVEN STREET, W.10.
Ladbroke 4655. 215-21

CELLULOSE ACETATE SCRAP, clear and light colours, sprues and runners and sheeting offcuts in quantities required. Please offer with samples to Herbert Connor, Ltd., 120 Beaufort Park, Falloden Way, London, N.W.11. 215-7

POLYTHENE, POLYSTYRENE, ACETATE, PERSPEX, ETC. Scrap and new material in large quantities urgently wanted. Please offer with samples to Herbert Connor, Ltd., 120 Beaufort Park, Falloden Way, London, N.W.11. 215-11

WANTED, large regular supplies of nylon scrap shaving. Hugh Kershaw, Oxenhope, Keighley. 220-1140

SITUATIONS VACANT

The engagement of persons answering advertisements in respect of vacant situations must be made through a local office of the Ministry of Labour, or a scheduled employment agency, if the applicant is a man between the ages of 18 and 64 inclusive or a woman between the ages of 18 and 59 inclusive, unless he or she, or the employment, is excepted from the provisions of Notification of Vacancies Order, 1952.

WE ARE LOOKING for a bench-hand with practical experience in the manipulation of P.V.C. Sheet Tube for our Plastics Department. The position offers considerable scope for advancement to the right type of individual. Applications should be made to the Works Manager, EGA Electric, Ltd., Holyhead Road, Wednesbury, stating age, wage required and experience. 215-1137

EXTRUSION OPERATOR.
LARGE AMERICAN CUSTOM EXTRUSION HOUSE LOOKING FOR EXPERIENCED MAN TO ASSIST PLANT SUPERVISOR IN EXTRUSION SET UP, DIE DESIGN, ETC.
MUST HAVE EXPERIENCE IN THE EXTRUSION OF ONE OR MORE OF THE FOLLOWING MATERIALS: CELLULOSICS, ACRYLIC, STYRENE, POLYETHYLENE AND NYLON.
WILL HELP RE-LOCATE RIGHT MAN. BOX P1335, CARE OF " PLASTICS." 215-42

DEPARTMENTAL MANAGER with knowledge of vacuum-forming technique required by well-known plastics company in Midlands. The position offers wide scope to suitable applicant. Non-contributory pension scheme. Applications giving full particulars should be addressed in strict confidence to Box P147, care of " Plastics." 215-1136

PLASTICS ENGINEER required for experimental and design department. He must be capable of designing injection moulded products and familiar with the production and uses of sheet materials, including alkathene film. Factory in West London. Write full details to Reference PE/1, Staff Division, The Metal Box Co., Ltd., The Langham, Portland Place, W.1. 215-13

DEPARTMENTAL MANAGER required for plastics company in London. High remuneration will be given to capable man with wide experience. Apply to managing director, Box P1516, care of " Plastics." 215-29

CHEMIST required by firm in North Midlands. Should be of degree standard with a knowledge of laminated plastics. He will be required to investigate the possible use of various types of materials in laminates. Box P1520, care of " Plastics." 215-25

Situations Vacant (contd.)

LARGE ORGANIZATION in West Manchester area has a vacancy for a man experienced in the field of low-pressure plastic mouldings and allied products. Initially the work will be of a development nature and ability to control labour, together with practical ingenuity, will be more desirable than technical qualifications. Applications from persons under 45 years of age and willing to reside in the area, should be made in writing to Box P1513, giving details of age, education, experience and salary required. 215-31

PLANNING ENGINEER required for London plastics factory. Applicants must be fully experienced in the application of modern production methods. High salary rate and good prospects for successful applicant. Apply to Managing Director, Box P1515, care of "Plastics." 215-28

PRODUCTION MANAGER required by London plastics company. A high salary will be paid to man fully experienced in modern production methods and with knowledge of all branches of the industry. Apply to Managing Director, Box P1517, care of "Plastics." 215-30

B.X. PLASTICS, LTD., Brantham Works, Nr. Manningtree, Essex, have a vacancy for a chemist or physicist. Age limit 35. The candidate should hold a degree or similar qualification, but alternatively, exceptionally good experience in the thermoplastic industry would be considered. The work is concerned in the main with technical service to the factory and to customers. Salary commensurate with experience and qualifications. Apply, giving full details of qualifications and career to date, to the Personnel Manager at Brantham Works. 215-16

BAKELITE, LTD., has a vacancy in its Vybak Production Department for a plant officer. Duties include the control of plant maintenance, co-ordination with the engineering department in plant design, modification and overhaul progressing of repairs and installations, investigations of plant breakdowns, etc.

Application should be made stating age and experience to the Labour Department Superintendent, Aycliffe Works, near Darlington, Co. Durham. 215-15

Situations Vacant (contd.)

SALES MANAGER with directorship at early date, if successful, required to take complete charge of sales organization of progressive new company manufacturing plastic tube, chemical plant, etc. Experience essential in similar products. Box P153, care of "Plastics." 215-x2749

MALE LABORATORY ASSISTANT required for work on polyvinyl chloride compounds, previous laboratory experience essential, experience on polyvinyl chloride desirable, age 22-26. Box P1511/JH, care of "Plastics." 215-6

PLASTICS FIRM near London setting up department for thermoplastic moulding requires manager for this department, applicants should have previous experience of moulding cellulose acetate, Perspex, rigid p.v.c., etc., good salary and house provided if required. Apply Box P157, care of "Plastics." 215-3

SENIOR TECHNICIAN required by leading plastic sheeting manufacturers, preference will be given to applicants with a degree in chemistry or engineering, practical knowledge of p.v.c. compounding and manufacturing processes, preferably calendering, first-class opportunity for advancement, salary between £800 and £1,200 per annum, depending on qualifications and experience, pension scheme. Write, giving full details, to Box P152, care of "Plastics." 215-1

ASSISTANT TO TECHNICAL DIRECTOR required for firm manufacturing p.v.c.-coated fabrics, etc., this is a fine opportunity with prospects for a person with wide experience and thoroughly conversant with all aspects of the various processes. Apply, giving full details of previous experience, age and salary required, to Box P154, care of "Plastics." 216-1139

ASSISTANT (MALE) required for work in laboratory of a plastics manufacturer, some laboratory and colour matching experience desirable, preference will be given to applicant with polyvinyl chloride experience, pension scheme and canteen available. Box P1510/DR, care of "Plastics." 215-5

Situations Vacant (contd.)

BECK KOLLER AND CO., LTD., SPEKE, LIVERPOOL, 19, manufacturers of Filabond polyester resins for glass-fibre reinforced plastics, have a vacancy in their Technical Service Laboratory for a demonstrator.

Applicants may be required to visit customers to demonstrate hot and cold laminating on a commercial scale.

Write, giving details of experience and salary required, to the Technical Director. 215-17

TIME RECORDERS

FACTORY TIME RECORDERS. Service rental. Phone, Hop 2230. Time Recorder Supply and Maintenance Co., Ltd., 157-158 Borough High St., S.E.1. 221-1102

WANTED

ADVERTISER requires to purchase plastic motto scrolls for fixing to heraldic shields. Box P1519, care of "Plastics." 215-26

BOOKS AND PUBLICATIONS

THE THEORY OF POLYMERIZATION, by H. R. Fleck, M.Sc., F.R.I.C. Full examination in simple language with examples, calculations and exercises of this fundamental aspect of the chemistry of plastics. Illustrated, 144 pages, 10s. 6d. net from booksellers, or 11s. by post from the publishers, Temple Press Ltd., Bowling Green Lane, London, E.C.1. zzz

PLASTICS, SCIENTIFIC AND TECHNOLOGICAL (3rd edition), by H. R. Fleck, M.Sc., F.R.I.C. A completely revised edition of a recognized standard work on the chemistry and technology of plastics. ". . . should be in every technical library."—Times Review of Industry. Illustrated, 400 pages, 40s. net from booksellers, or 40s. 9d. by post from the publishers, Temple Press Ltd., Bowling Green Lane, London, E.C.1. zzz

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Climax
FINISHING MOPS
Ideal for use with "Lustre" and "Vonite" compositions or finishing celluloid, acetate and other plastics.
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BIRMINGHAM 18

FOR

METALLIZING

PLEASE CONSULT

ALMA PLATING WORKS LIMITED

HEDGE LANE · LONDON · N.13

Telephone : PALmers Green 0055

EDITORIAL AND BUSINESS NOTICES

"PLASTICS" is published on the second Wednesday in each month in London, England, by TEMPLE PRESS LIMITED, and is registered for transmission to Canada and Newfoundland by magazine post.

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BRANCH OFFICES.—7 John Bright Street, Birmingham, 1. Telephone: Midland 4117-8. 50 Hertford Street, Coventry. Telephone: Coventry 62464. 1 Brazennose Street, Manchester, 2. Telephone: Blackfriars 5038-9. 12 Renfield Street, Glasgow. Telephone: Glasgow Central 1413.

EDITORIAL.—All editorial communications and matter must be addressed to the Editor and not to individuals. Drawings or MSS or other material not considered suitable will be returned if stamps are enclosed, but the Editor does not hold himself responsible for the safe keeping or safe return of anything submitted for his consideration. Payment for contributions will be made during the month following publication.

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Vol. XX. No. 215

Plastics

JUNE, 1955

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for G.E.C.

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and
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KLP grade
polystyrene
for the
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